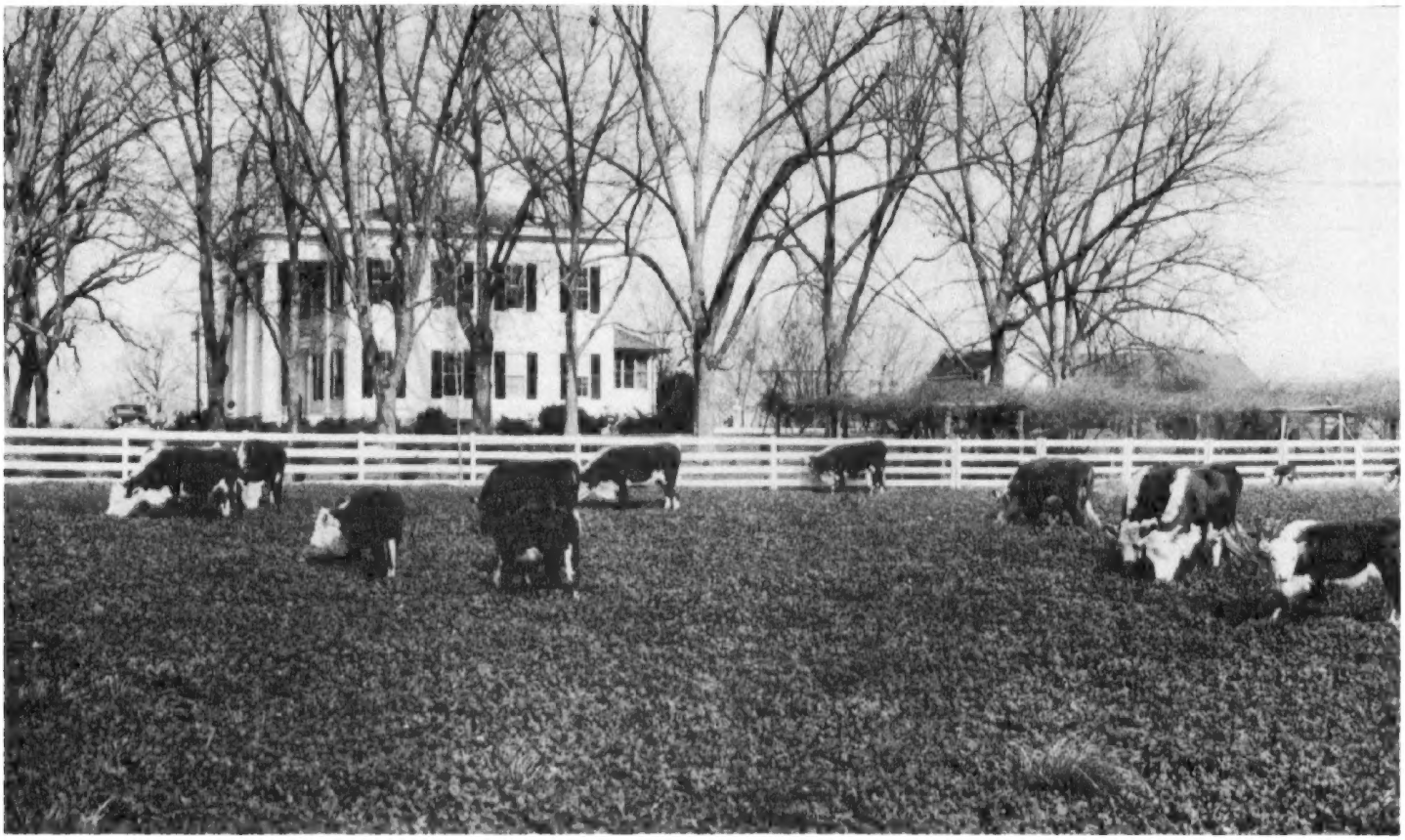
SOIL SURVEY

Morgan County Georgia



UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
in cooperation with
UNIVERSITY OF GEORGIA, COLLEGE OF AGRICULTURE
Agricultural Experiment Stations

Series 1962, No. 6

Issued September 20, 1965

HOW TO USE THE SOIL SURVEY REPORT

THIS SOIL SURVEY of Morgan County, Ga., will serve several groups of readers. It will help farmers in planning the kind of management that will protect their soils and provide good yields; assist engineers in selecting sites for roads, buildings, ponds, and other structures; aid foresters in managing woodland; and add to our knowledge of soil science.

Locating soils

Use the index to map sheets at the back of this report to locate areas on the detailed soil map. On this the boundaries of the soils are outlined and each kind of soil is identified by a symbol. All areas marked with the same symbol are the same kind of soil, wherever they appear on the map. Suppose, for example, an area has the symbol CYB. The legend for the detailed map shows that this symbol identifies Cecil sandy loam, 2 to 6 percent slopes. This soil and all others mapped in the county are described in the section "Descriptions of Soils."

Finding information

The "Guide to Mapping Units" at the back of this report can help readers in using the map and the report. This guide lists each soil mapped in the county and the number of the page on which each is described. It also lists, for each soil, the capability unit and the woodland and wildlife suitability groups in which the soil has been placed, and the number of the page on which each of these groupings is described. Readers will want to refer to different parts of the report, according to their special interests.

Farmers and those who work with farmers can learn about the soils in the section "Descriptions of Soils" and then turn to the sections "Use of Soils for Cultivated Crops and Pasture" and "Estimated Yields." In this way they first identify the soils on their farm and then learn how these soils can be managed and what yields can be expected. The soils are grouped by capability units, which are groups of soils that need similar management and respond in about the same way. Cecil sandy loam, 2 to 6 percent slopes, for example, is in capability unit IIe–1. The capability units are discussed in the section "Use of Soils for Cultivated Crops and Pasture."

Foresters and others interested in woodland can refer to the section "Use of Soils for Woodland." In this section the soils of the county are grouped according to their suitability for trees, and factors affecting the management of woodland are explained.

Game managers, sportsmen, and others interested in wildlife can refer to the section "Use of Soils for Wildlife and Fish," which provides information about the suitability of the soils for wildlife.

Engineers will want to refer to the section "Engineering Uses of Soils." Tables in that section show characteristics of the soils that affect engineering.

Scientists and others who are interested will find information about how the soils formed and how they were classified in the section "Genesis, Morphology, and Classification of Soils."

Students, teachers, and other users will find information about soils and their management in various parts of the report, depending on their particular interest.

Newcomers in Morgan County will be especially interested in the section "General Soil Map," in which broad patterns of soils are described. They may also be interested in the sections "General Nature of the Area" and "Additional Facts About Morgan County," which give information about climate, topography, drainage, population, and agriculture.

* * * * *

Fieldwork for this survey was completed in 1962. Unless otherwise indicated, all statements in the report refer to conditions in the county at that time. This soil survey was made as part of the technical assistance furnished by the Soil Conservation Service to the Piedmont Soil and Water Conservation District.

***Cover picture.*—Farm home and clover pasture on Cecil sandy loam, 2 to 6 percent slopes, eroded. Soils of the Cecil series cover nearly half of the county and are suitable for many purposes.**

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Series 1962, No. 6

Issued September 20, 1965

SOIL SURVEY OF MORGAN COUNTY, GEORGIA

REPORT BY HARLEY H. PAYNE, SOIL CONSERVATION SERVICE

SOILS SURVEYED BY HARLEY H. PAYNE AND JERRY A. PILKINTON, SOIL CONSERVATION SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, IN COOPERATION WITH THE UNIVERSITY OF GEORGIA, COLLEGE OF AGRICULTURE, AGRICULTURAL EXPERIMENT STATIONS

MORGAN COUNTY occupies 357 square miles, or 228,480 acres, in the north-central part of Georgia (fig. 1). The county is shaped like an arrowhead, with the point to the north. It measures approximately 24 miles from east to west and 27 miles from north to south. It is bounded on the northeast by the Apalachee River, which separates it from Oconee and Greene Counties. The Apalachee River flows into the Oconee River, which separates Morgan County from Greene County on the east.

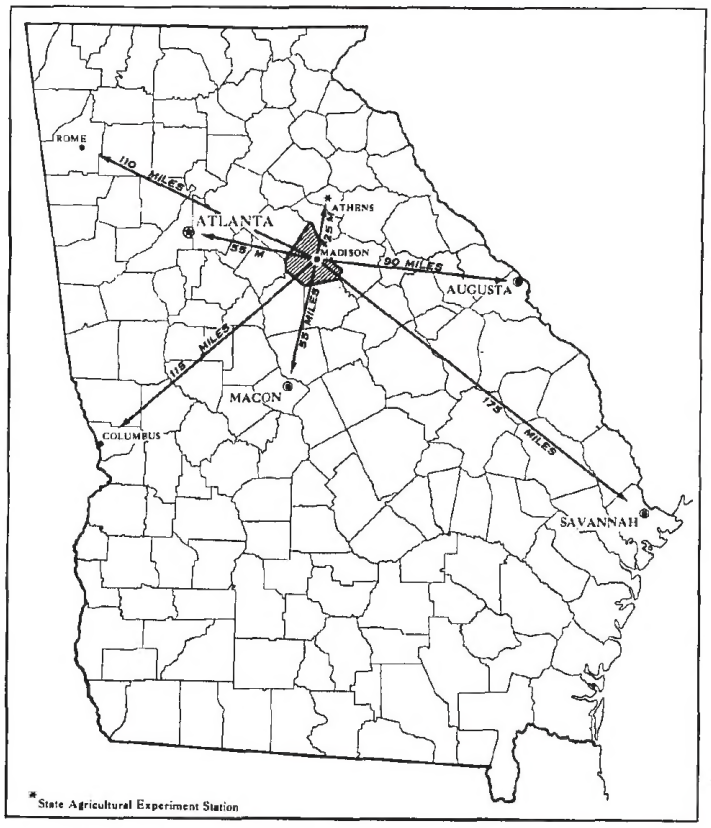

Figure 1.—**Location of Morgan County in Georgia.**

The highest point in the county, at Fairplay, is 795 feet above sea level. The lowest point is along the Oconee River in the southeastern part of the county. Practically all of the upland areas are well drained by the many branching creeks and streams. Large areas of flood plains along Sandy, Hard Labor, and Indian Creeks are subject to frequent overflow and must be drained if they are to be used for agriculture.

General Nature of the Area

This section describes the geology, drainage, physiography, water supply, and climate of Morgan County.

Geology, Drainage, and Physiography

Morgan County is entirely within the Piedmont Plateau. It is underlain by granite gneiss, hornblende gneiss, diorite, granite, quartz mica schist, and intrusions of acidic and basic rocks. The effect of these rocks on the soils is discussed in the section "Genesis, Morphology, and Classification of Soils."

All of Morgan County is drained by the Oconee River. The northern half of the county is drained by Jacks, Sandy, and Hard Labor Creeks, which flow into the Apalachee River. The Apalachee River in turn flows into the Oconee River at the eastern tip of the county. The eastern part of the county is drained by Sugar Creek, which flows across the northeastern corner of Putnam County and into the Oconee River. The southwestern part of the county is drained by the Little River and Indian Creek, which join just south of the county line and flow south and eventually east into the Oconee River at Lake Sinclair.

The topography of Morgan County, a large area of gently sloping land composed of broad ridges with long smooth slopes, is the result of a long period of erosion of an old, smooth plain. Streams have cut deep, V-shaped valleys separated by narrow, steep divides. Along the Apalachee and Oconee Rivers, in the northeastern and eastern parts of the county, the topography is strongly sloping and steep.

The ridges that separate the drainage areas of Indian, Hard Labor, and Sugar Creeks are 600 to 795 feet above sea level. These ridges are mostly free of knolls and saddles. They extend from the Walton County line west of Rutledge to Madison. From here, one prong extends eastward along the Georgia Railroad almost to Swords, and the other extends south to the Putnam County line along U.S. Highway No. 441. Another ridge separates the drainage area of Sandy Creek and the Apalachee River and extends from the Walton County line west of Bostwick eastward beyond Apalachee.

The lowest elevation, which is approximately 400 feet above sea level, is at the southeastern corner of the county, along the Oconee River.

Climate [1]

The climate of Morgan County is characterized by warm to hot summers and by moderately cold, but highly variable, winter weather. The precipitation pattern shows a maximum early in spring, a minimum in fall, and fairly even distribution for the rest of the year.

Summer days are generally hot. Temperatures reach or exceed 90° F. in the afternoon on about 3 out of 5 days during June, July, and August. Some 90-degree weather can also be expected late in May and through much of September. Temperatures of 100° or slightly higher occur during most summers, but usually on only 1 or 2 days. Summer nights are not uncomfortably warm, for the temperature usually drops to 70° or below by early morning. The average minimum for the 3 summer months is about 68°. Only during July is the average temperature as high as 80°.

Winter weather is much more variable than summer weather. Cold spells, during which temperatures drop to freezing or below early in the morning, occur frequently from late in November to early in March, but these spells are usually of short duration and alternate with periods of relatively mild weather. Freezing temperatures occur on an average of 50 days each winter, but a temperature of 20° or lower may be expected on only about 5 days. Temperatures usually rise to above freezing in the daytime, even during the coldest weather.

The spring and fall seasons both are short. Because of the persistence of the winter season, spring is usually cooler than fall. Early in spring the weather is generally windy and wet, with frequent and abrupt changes. Fall, on the other hand, is noted for mild, sunny weather.

Morgan County's freeze-free growing season is about 225 days and usually extends from late in March to early in November. The last freeze in spring has occurred as early as February 24 and as late as April 21. The date of the first temperature of 32° in fall has ranged from October 17 to November 27. The probabilities of freezing temperatures of specified intensity after certain dates in spring and before certain dates in fall are given in table 7, p. 36, in the section "Climate and Crops."

The average annual precipitation is about 47.5 inches. Ordinarily, spring has slightly more precipitation than either summer or winter, and fall is by far the driest season of the year. On the average, the rainfall in any month is more than 2 inches and less than 5½ inches. Most of the county's cool-season precipitation results from the interaction of cold air from the north and northwest and warm moist air from the south. The resulting fronts and storm centers are usually widespread and often bring precipitation of several hours duration to large areas. Summer precipitation comes primarily from local convective storms and is much less uniform in area coverage. Although small in extent and usually of short duration, these summer showers are often intense and may cause considerable erosion, particularly late in spring and early in summer when freshly plowed fields have little vegetative cover. Thunderstorms occur on 50 or more days each year, and some are accompanied by locally damaging winds. Tornadoes have been reported infrequently.

Snowfall is usually insignificant. Very light falls occur during most winters, but there is rarely enough to cause any appreciable accumulation.

The average monthly relative humidity in Morgan County usually is 80 to 90 percent early in the morning and 50 to 60 percent early in the afternoon. The higher averages for both morning and afternoon generally come in fall and the lower averages late in spring. Average windspeeds are about 7 to 11 miles per hour, with the higher averages occurring in winter and early in spring and the lower averages in midsummer.

Table 1 shows, by months, the average daily maximum temperature, the average daily minimum temperature, and the average precipitation.

Water Supply

Hard Labor Creek and Speeds Branch furnish water for the city of Madison. Most farms get water from shallow dug wells, which commonly yield 2 to 5 gallons per minute. These wells are approximately 25 feet deep in the area near Bostwick, 40 feet deep in the Buckhead section, and 60 feet deep in the Eatonton road section. Drilled wells, commonly 100 to 170 feet deep, provide water for the town of Rutledge and for many rural homes and dairies. Streams and farm ponds furnish most of the water for livestock. The water table is generally highest in April and May and lowest in October and November.

How Soils Are Mapped and Classified

Soil scientists made this survey to learn what kinds of soils are in Morgan County, where they are located, and how they can be used.

They went into the county knowing they would find many soils they had already seen and perhaps some they had not. As they traveled over the county, they observed steepness, length, and shape of slopes; size and speed of streams; kinds of native plants or crops; kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down to the rock material that has not been changed much by leaching or by roots.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. To use this report efficiently, it is necessary to know the kinds of groupings most used in soil classification.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, the major horizons of all the soils of one series are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Cecil and Lloyd, for example, are the names of two soil series in Morgan

[1] Prepared by HORACE S. CARTER, State climatologist, U.S. Weather Bureau.

TABLE 1.—*Temperature and precipitation data*

[Data based on records at Greensboro, Greene County, Ga., and at Athens, Clarke County, Ga.]

Month	Temperature				Precipitation		
	Average daily maximum	Average daily minimum	2 years in 10 will have at least 4 days with—		Average total	1 year in 10 will have—	
			Maximum temperature equal to or higher than—	Minimum temperature equal to or lower than—		Less than—	More than—
	°F.	°F.	°F.	°F.	In.	In.	In.
January	57.0	35.9	72	21	4.52	2.3	8.4
February	59.5	36.8	74	20	4.16	1.7	6.7
March	65.8	41.8	80	28	5.40	2.5	9.2
April	75.3	49.8	87	36	4.29	1.3	8.9
May	83.2	58.3	93	46	4.01	1.6	8.8
June	90.3	66.2	99	58	3.17	1.1	5.1
July	91.3	68.9	99	64	4.91	3.2	7.2
August	90.8	68.1	98	61	4.30	2.2	5.6
September	85.5	63.2	97	52	3.28	.9	6.6
October	76.3	52.2	87	39	2.45	.5	5.5
November	65.2	41.2	79	25	2.76	.7	8.7
December	56.9	35.6	71	22	4.21	1.8	8.4
Year	74.8	51.5	[1] 100	[1] 16	47.46	36.5	59.5

[1] The extreme temperatures that will be equalled or exceeded (minimum equal or lower) on at least 4 days in 2 years out of 10.

County. All the soils in the United States having the same series name are essentially alike in those characteristics that go with their behavior in the natural, untouched landscape. Soils of one series, however, can differ somewhat in texture of the surface soil and in slope, stoniness, or some other characteristic that affects use of the soils by man.

Many soil series contain soils that differ in the texture of their surface layer. According to such differences in texture, separations called soil types are made. Within a series, all the soils having a surface layer of the same texture belong to one soil type. Cecil sandy loam and Cecil sandy clay loam are two soil types in the Cecil series. The difference in texture of their surface layers is apparent from their names.

Some soil types vary so much in slope, degree of erosion, or some other feature affecting their use, that practical suggestions about their management could not be made if they were shown on the soil map as one unit. Such soil types are divided into phases. The name of a soil phase indicates a feature that affects management. For example, Cecil sandy loam, 2 to 6 percent slopes, eroded, is one of several phases of Cecil sandy loam, a soil type that in this county ranges from very gently sloping to strongly sloping.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, trees, and other details that help in drawing boundaries accurately. The soil map in the back of this report was prepared from aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning management of farms and fields, a mapping unit is nearly equivalent to a soil type or a phase of a soil type. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil type or soil phase.

In preparing some detailed maps, the soil scientists have a problem of delineating areas where different kinds of soils are so intricately mixed or occur in bodies of such small size that it is not practical to show them separately on the map. Therefore, they show this mixture of soils as one mapping unit and call it a soil complex. Ordinarily, a soil complex is named for the major soil series in it, for example, Louisburg complex. Also, on most soil maps there are areas to be shown that are so rocky, so shallow, or so frequently worked by wind and water that they scarcely can be called soils. These areas are shown on the soil map like other mapping units, but they are given descriptive names, such as Gullied land or Alluvial land, and are called land types rather than soils.

While a soil survey is in progress, samples of soils are taken, as needed, for engineering tests. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soils. Yields under defined management are estimated for all the soils.

But only part of the soil survey is done when the soils have been named, described, and delineated on the map, and the yield data have been assembled. The mass of detailed information then needs to be organized in a way that is readily useful to different groups of users, among them farmers, managers of woodland, engineers, and homeowners. Grouping soils that are similar in suitability for each specified use is the method of organization commonly used in the soil survey reports. On the basis of the yield and practice tables and other data, the soil scien-

tists set up trial groups. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others, then adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under present methods of use and management.

General Soil Map

After study of the soils in a locality and the way they are arranged, it is possible to make a general map that shows several main patterns of soils, called soil associations. Such a map is the colored general soil map in the back of this report. Each association, as a rule, contains a few major soils and several minor soils, in a pattern that is characteristic although not strictly uniform.

The soils within any one association are likely to differ from each other in some or in many properties; for example, slope, depth, stoniness, or natural drainage. Thus, the general soil map shows, not the kind of soil at any particular place, but patterns of soils, in each of which there are several different kinds of soils.

Each soil association is named for the major soil series in it, but, as already noted, soils of other series may also be present. The major soils of one soil association may also be present in another association, but in a different pattern.

The general soil map is useful to people who need only a general idea of the soils, who want to compare different parts of a county, or who want to know the possible location of good-sized areas suitable for a certain kind of farming or other land use.

The four soil associations in Morgan County are discussed in the paragraphs that follow.

1. Cecil-Lloyd association

Soils with clayey and chiefly red subsoil

This association is characterized by long, broad, gently sloping ridgetops, moderately steep to steep valley slopes, and numerous small draws. It covers about 69 percent of the county.

Cecil and Lloyd soils are dominant in this association. These soils are well drained, and where they are not severely eroded, they have a surface layer of friable sandy loam. The finer textured part of the subsoil is clayey, and it ranges in color from red in Cecil soils to dark red in Lloyd soils.

Also in this association are soils of the Appling series, which are less red than the dominant soils and generally are mottled in the lower part of the subsoil. Local alluvial land occupies depressions and heads of drains. There is a small acreage of Vance soils, which are mod-

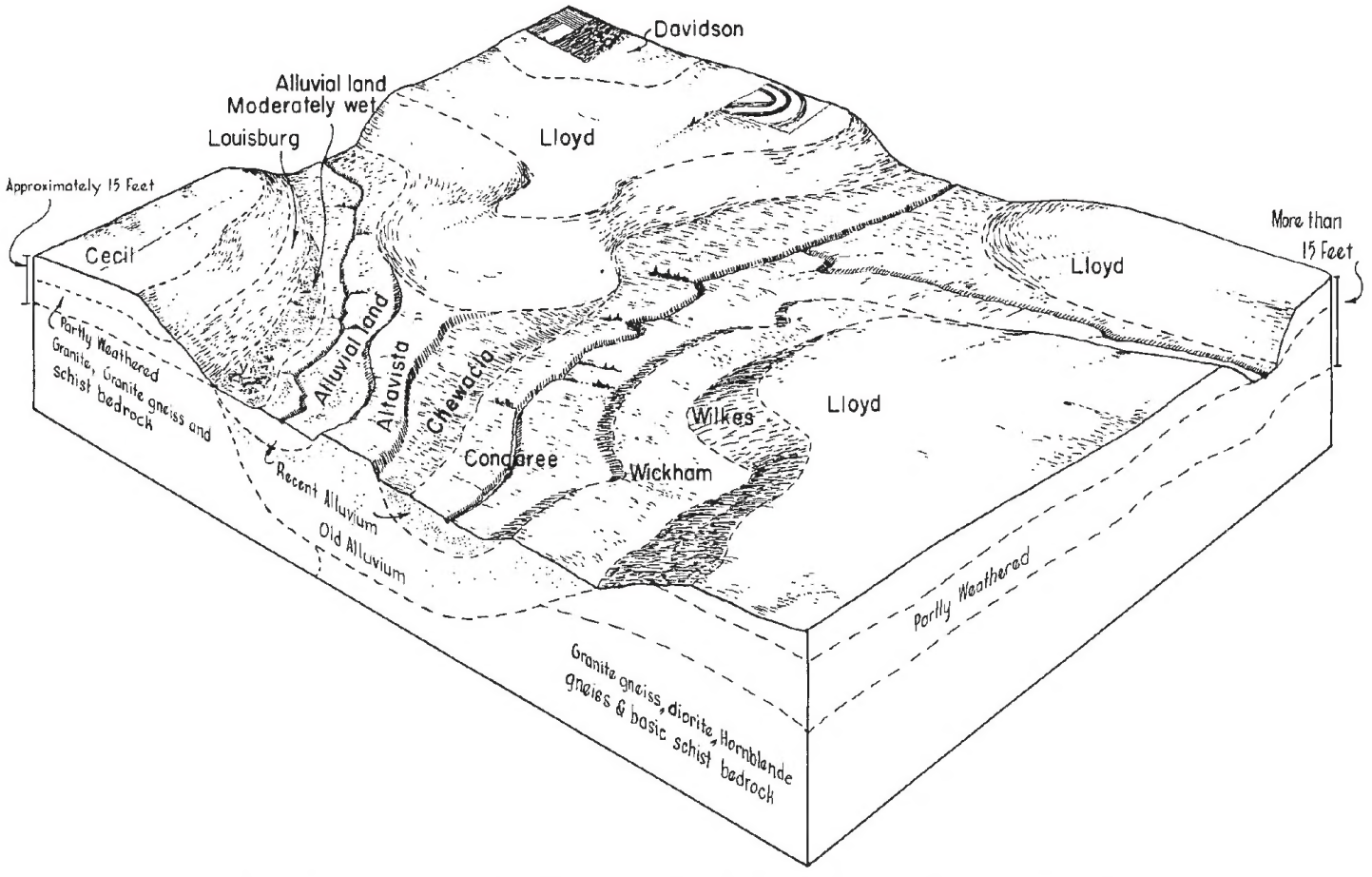

Figure 2.—**Diagram showing relationship of dominant soils in Lloyd-Davidson association.**

erately well drained and have very firm, tough to plastic subsoil. The somewhat poorly drained Colfax soils are at the head of some draws, and a few small areas of the poorly drained Worsham soils are included also. The narrow flood plains consist of the well-drained Congaree soils and Alluvial land or of the somewhat poorly drained Chewacla soils and Alluvial land, moderately wet. The moderately steep and steep valley slopes generally consist of the severely eroded Cecil and Lloyd soils, and there are some areas of the shallow Wilkes and Louisburg soils. Altavista and Wickham soils occupy stream terraces. Wickham soils are better drained and are at a higher elevation than are Altavista soils, which are only a few feet above the flood plain.

Cecil soils make up 50 percent of the association, Lloyd soils 40 percent, and the other soils about 10 percent.

The broad, smooth ridges are the most intensively cultivated part of the association. Much of the acreage is pastured. About 65 percent of the association is so severely eroded that the plow layer is largely original subsoil material. On about 11 percent of the acreage there is an intricate pattern of gullies. Most of the steeper slopes that were once cropped are now in pines. A considerable acreage throughout the association has been planted to loblolly pine.

The farms in this association are about half cotton farms and half dairy or beef cattle farms. Most are well managed and productive. About half are owner operated. There are some part-time farmers whose major income is from work off the farm.

The soils in this association generally respond well to good management. Except where severely eroded, they are easily tilled and are suited to a wide range of crops. Cotton, corn, small grain, lespedeza, and Coastal bermudagrass are some of the common crops. The soils are predominantly in capability classes II and III, but a considerable acreage is in classes IV and VI.

The less sloping uplands in this association are some of the best areas in the county for residential and industrial development, for highways, and for such recreational uses as campsites, picnic areas, intensive play areas, and golf fairways.

2. *Lloyd-Davidson association*

Soils with dark-red to red clayey subsoil

This association is characterized by long, broad, gently sloping ridgetops, moderately steep valley slopes, and many small draws. It occupies about 12 percent of the county and is mostly in the southern part.

Dominant in the association are Davidson and Lloyd soils (fig. 2). These soils are well drained and have a surface layer of friable loam, sandy loam, or clay loam. The subsoil is predominantly dark-red clay, but the color ranges from red to dark reddish brown. Davidson soils have a darker reddish-brown surface layer than Lloyd soils.

Also in the association are soils of the Cecil, Iredell, and Wilkes series. Davidson and Lloyd soils are darker throughout than Cecil soils, which also are well drained. Iredell soils are more poorly drained than Davidson and Lloyd soils and have dark yellowish-brown to light olive-brown, very plastic and sticky clay subsoil. Local alluvial land is in depressions and at the head of drains. The shallow Wilkes soils occur on some of the steeper side slopes. The narrow flood plains along small steams consist of well-drained Alluvial land and Alluvial land, moderately wet. Some well-drained Congaree soils and the somewhat poorly drained to moderately well drained Chewacla soils are on the flood plains of larger streams.

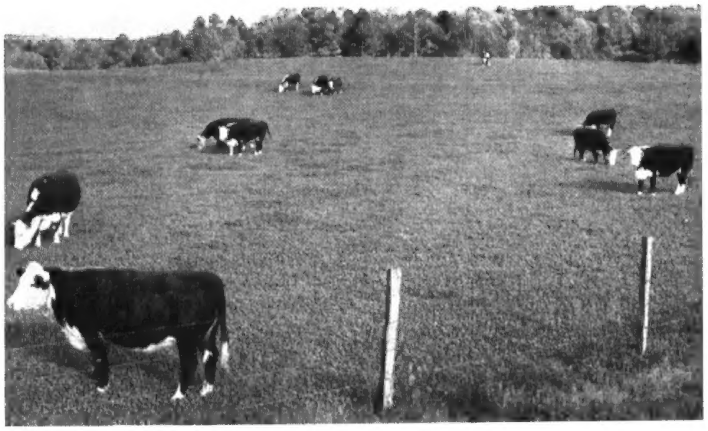

Figure 3.—**Registered Herefords grazing white clover and tall fescue. Soil in foreground is Davidson loam, 2 to 6 percent slopes, eroded. Wooded area in background is Lloyd clay loam, 6 to 10 percent slopes, severely eroded.**

Lloyd soils make up about 40 percent of the association, Davidson soils 25 percent, and other soils about 35 percent.

The broad, smooth ridges in this association are used for crops, hay, pasture, and orchards. Much of the acreage is eroded. Some 60 percent is so severely eroded that the surface layer is largely original subsoil material. In some areas there is an intricate pattern of gullies. Most of the steeper slopes that were once cropped are now in pines.

About half of the farms are owner operated. Dairy and beef cattle farms (fig. 3) predominate. Most are well managed and productive.

The soils in this association respond to good management. They all have a tendency to stick to the plow when moist, but they are fairly easy to work, except where severely eroded. They are suited to a wide range of crops and are used for cotton, corn and sorghum for silage, peaches, hay crops, and temporary pasture. The soils in this association are predominantly in capability classes III and IV.

The less sloping uplands in this association are good areas for residential and industrial development. Because these soils are sticky and slippery when wet, some surface treatment is needed on walkways, driveways, and parking lots.

3. *Appling-Cecil association*

Soils with yellowish-brown to red clayey subsoil, mottled in the lower part in some places

This association is characterized by broad, gently sloping, interstream divides dissected by numerous small draws. It occupies about 10 percent of the county and is in the western part.

Appling and Cecil soils are dominant in this association. These soils are well drained and have a surface layer of friable sandy loam and loamy coarse sand. Appling soils

generally have a yellowish-brown surface layer and a subsoil of yellowish-brown to yellowish-red sandy clay loam over mottled clay. Cecil soils have red clay subsoil.

Also in the association are well-drained soils of the Lloyd series, which have a brown to reddish-brown surface layer and red to dark-red subsoil. There are small areas of the somewhat poorly drained to moderately well drained Helena soils, which have firm, plastic, mottled, clayey subsoil. At the head of some draws and in depressions, well-drained Local alluvial land has accumulated, and in other draws and depressions the somewhat poorly drained Colfax soils occur. Also, there are some small areas of the poorly drained Worsham soils. The streams are generally small and intermittent, but the flood plains of one or two of the larger streams consist of Alluvial land and Alluvial land, moderately wet.

Appling soils make up about 40 percent of the association, Cecil soils 35 percent, Lloyd soils 15 percent, and other soils about 10 percent.

The broad, smooth ridges in this association are the most intensively cultivated areas of the county. Appling soils are preferred by many farmers for growing cotton. Most of the acreage is eroded. In about 25 percent of the area, severe erosion has removed all of the original surface layer and exposed the subsoil. Most of the steeper slopes and adjacent draws that once were cropped are now in pines or pasture.

Most of the farms in this association are small, well managed, productive, and owner operated. A number of farmers who own small acreages of open land have leased the land to other farmers who have more machinery and labor. The soils generally respond well to good management. They are easy to work and are suited to a wide range of crops. Cotton, corn, and small grain are common crops. There are a few dairy farms. These soils are predominantly in capability classes II and III.

The less sloping uplands in this association are good areas for residential and industrial development.

4. Alluvial land-Chewacla association

Poorly drained to moderately well drained soils on flood plains, subject to overflow

This association consists of the long, narrow to fairly broad flood plains along the larger streams and of the adjacent terraces. It occupies about 9 percent of the county.

Alluvial land, Alluvial land, moderately wet, and Alluvial land, wet, all of which are on the flood plains, make up the largest acreage in this association. Also on the flood plains are the Chewacla soils, which are somewhat poorly drained to moderately well drained and are not so thinly stratified as are the alluvial lands. There are a few areas of the well-drained Congaree soils and the poorly drained Wehadkee soils. The surface layer of these soils ranges from fine sandy loam to silty clay loam. Wickham soils occur on the higher stream terraces. They are well drained and have a fine sandy loam surface soil and yellowish-red sandy clay loam subsoil. All of the soils on the flood plains and some of those on low terraces are subject to flooding.

The soils of this association are easily tilled. Generally, they are parts of farms that lie mostly in another soil association. They are used for pasture, corn, silage crops, and hay crops. About 80 percent of the acreage is forested, mostly with hardwoods. The soils on the flood plains are in capability subclasses IIw, IIIw, and IVw, and those on stream terraces are in classes I and II.

Because of the flood hazard and a seasonally high water table, most of this association has very severe limitations for use as residential areas, industrial sites, highways, campsites, picnic areas, intensive play areas, and golf fairways.

Descriptions of Soils

In this section the soil series (groups of soils) and mapping units (single soils) are described, and their use and suitability for agriculture are discussed. The location and distribution of the single soils are shown on the soil maps at the back of this report. The acreage and proportionate extent of each soil are given in table 2.

The series description gives information about the general nature of the soils in the series and their relationship to soils in other series; about relief, drainage, and natural vegetation; and about the use of the soils.

Following the series description are descriptions of the mapping units in each series. The first is a detailed description, including a description of a profile that is generally representative of the soils in the series. If there are more mapping units, they are, as a rule, discussed in relation to the one described first.

It will be helpful to the reader to refer to the section "How Soils Are Mapped and Classified," in which series, type, phase, and other special terms used in describing the soils are defined. Many terms used in the soil descriptions are defined in the Glossary. The section "Genesis, Morphology, and Classification of Soils" contains a more detailed description of a representative soil profile from each series. For more general information about the soils, the reader can refer to the section "General Soil Map," in which the broad patterns of soils are discussed.

Alluvial Land

Alluvial land consists of areas of stratified alluvium recently deposited by streams on first bottoms and flood plains. This alluvium varies widely in texture and is subject to frequent change resulting from stream overflow.

Alluvial land (0 to 2 percent slopes) (Alm).—This land type consists of thinly stratified sediments that have been deposited on nearly level flood plains. This alluvial material is generally stratified sand, silt, and some clay and varies widely within short distances. The plow layer generally ranges from light yellowish-brown fine sandy loam to dark reddish-brown silt loam. Beneath it are layers of various textures and colors. Mottles are generally more than 30 inches below the surface, but a few small areas are mottled at a depth of 15 inches. Small areas are covered with an overwash of sand. Drainage is moderately good or good, but this land must be protected from floods.

The alluvium is strongly acid. The natural fertility and the organic-matter content are medium or low. The tilth is good. Surface runoff is medium, and permeability is moderate. The available moisture capacity is generally medium or high. Most of this extensive land type

TABLE 2.—*Approximate acreage and proportionate extent of the soils*

Soil	Acres	Percent	Soil	Acres	Percent
Alluvial land	6,050	2.6	Helena sandy loam, 2 to 6 percent slopes, eroded	350	0.1
Alluvial land, moderately wet	8,470	3.7	Helena sandy loam, 6 to 10 percent slopes, eroded	650	.3
Alluvial land, wet	500	.2	Helena sandy clay loam, 2 to 6 percent slopes, severely eroded	70	(1)
Altavista sandy loam, 0 to 2 percent slopes	280	.1	Helena sandy clay loam, 6 to 10 percent slopes, severely eroded	510	.2
Altavista sandy loam, 2 to 6 percent slopes	310	.1	Iredell sandy loam, 2 to 6 percent slopes	80	(1)
Appling loamy coarse sand, 2 to 6 percent slopes, eroded	4,550	2.0	Lloyd sandy loam, 2 to 6 percent slopes, eroded	18,660	8.2
Appling loamy coarse sand, 2 to 6 percent slopes	220	.1	Lloyd sandy loam, 6 to 10 percent slopes, eroded	2,490	1.1
Appling loamy coarse sand, 6 to 10 percent slopes, eroded	840	.4	Lloyd sandy loam, 10 to 15 percent slopes, eroded	1,280	.6
Appling sandy clay loam, 2 to 6 percent slopes, severely eroded	370	.2	Lloyd clay loam, 2 to 6 percent slopes, severely eroded	15,950	7.0
Appling sandy clay loam, 6 to 10 percent slopes, severely eroded	500	.2	Lloyd clay loam, 6 to 10 percent slopes, severely eroded	20,760	9.1
Cecil sandy loam, 2 to 6 percent slopes, eroded	20,770	9.1	Lloyd clay loam, 10 to 15 percent slopes, severely eroded	10,590	4.6
Cecil sandy loam, 2 to 6 percent slopes	210	.1	Lloyd clay loam, 15 to 25 percent slopes, severely eroded	530	.2
Cecil sandy loam, 6 to 10 percent slopes, eroded	620	.3	Lloyd-Gullied land complex, 6 to 10 percent slopes	1,560	.7
Cecil sandy loam, 10 to 15 percent slopes, eroded	510	.2	Lloyd-Gullied land complex, 10 to 15 percent slopes	480	.2
Cecil sandy loam, 15 to 25 percent slopes, eroded	3,630	1.6	Local alluvial land	1,210	.5
Cecil sandy clay loam, 2 to 6 percent slopes, severely eroded	23,480	10.3	Louisburg complex, 10 to 15 percent slopes	1,530	.7
Cecil sandy clay loam, 6 to 10 percent slopes, severely eroded	21,270	9.3	Louisburg complex 6 to 10 percent slopes	170	.1
Cecil sandy clay loam, 10 to 15 percent slopes, severely eroded	18,400	8.0	Louisburg stony complex, 15 to 25 percent slopes	320	.1
Cecil sandy clay loam, 15 to 25 percent slopes, severely eroded	490	.2	Vance sandy loam, 2 to 6 percent slopes, eroded	160	(1)
Cecil-Gullied land complex, 2 to 6 percent slopes	840	.4	Vance sandy loam, 6 to 10 percent slopes, eroded	160	(1)
Cecil-Gullied land complex, 6 to 10 percent slopes	18,000	7.9	Wehadkee silty clay loam	580	.3
Cecil-Gullied land complex, 10 to 15 percent slopes	2,270	1.0	Wickham fine sandy loam, 2 to 6 percent slopes, eroded	890	.4
Chewacla silt loam	2,180	.9	Wickham clay loam, 6 to 10 percent slopes, severely eroded	210	.1
Colfax sandy loam, 2 to 6 percent slopes	360	.2	Wilkes complex, 10 to 15 percent slopes, eroded	2,450	1.1
Congaree silt loam	2,250	1.0	Wilkes complex, 2 to 6 percent slopes, eroded	130	(1)
Davidson loam, 2 to 6 percent slopes, eroded	2,410	1.1	Wilkes complex, 6 to 10 percent slopes, eroded	810	.4
Davidson clay loam, 2 to 6 percent slopes, severely eroded	1,890	.8	Wilkes complex, 15 to 25 percent slopes	550	.2
Davidson clay loam, 6 to 10 percent slopes, severely eroded	1,250	.5	Worsham sandy loam, 2 to 6 percent slopes	980	.4
Davidson clay loam, 10 to 15 percent slopes, severely eroded	550	.2	Lakes, streams, and ponds	660	.3
Gullied land	240	.1	Total	228,480	100.0

[1] Less than 0.05 percent of the total area.

has been cultivated, but now 60 percent is in woods and the rest is cultivated or pastured. Fields are mostly long and narrow. Many kinds of crops can be grown. (Capability unit IIw–2; woodland group 1; wildlife group 7)

Alluvial land, moderately wet (0 to 2 percent slopes) (Alp).—This land type consists of deep, somewhat poorly drained alluvium on first bottoms. This material is thinly stratified sand, silt, and some clay, and varies widely within short distances. The plow layer ranges from light yellowish-brown fine sandy loam to dark reddish-brown silty clay loam. Beneath it are layers of various textures and colors. Mottles are generally 12 to 28 inches below the surface. The water table is at or near the surface during wet periods and at a depth of 18 to 40 inches during dry spells. This land type is flooded at irregular but short intervals, mostly during winter.

The alluvium is strongly acid. The natural fertility and the organic-matter content are low or medium. Surface runoff is slow, and permeability is moderate. The available moisture capacity is medium. Except in a few wet spots, the tilth is good. Ditching is required to remove excess surface water and to provide internal drainage.

This land type is suited to most crops that are tolerant of some wetness. It is extensive, and most of the acreage has been cleared, drained, and cultivated. Now 90 percent of the acreage has reverted to hardwood forest, and only 10 percent is cultivated or pastured. (Capability unit IIIw–2; woodland group 9; wildlife group 8)

Alluvial land, wet (0 to 2 percent slopes) (Avp).—This land type consists of wet alluvium on first bottoms. It generally occurs next to the hills and at a slightly lower elevation than the better drained alluvial lands adjacent to the stream. It is flooded for long periods, and the water table is at the surface most of the time. The texture of the surface and subsurface layers ranges from fine sandy loam to silty clay loam, and in a few places there is coarse sand on the surface. The predominant color is mottled

dark grayish brown in the uppermost 3 to 9 inches and mottled gray in the lower part.

The alluvium is medium acid or strongly acid. The organic-matter content and the natural fertility are low. Permeability is generally moderately slow, and the available moisture capacity is low. Surface runoff is ponded to slow. Crops can be grown only if surface and internal drainage are provided. The total acreage in the county is small, and it is all in hardwood forest. (Capability unit IVw–1; woodland group 9; wildlife group 9)

Altavista Series

The Altavista series consists of deep, moderately well drained soils that developed in old alluvium on stream terraces. The surface layer is dark grayish-brown to brown sandy loam. The subsoil is yellowish-brown sandy clay loam that is mottled with light gray and yellowish red at a depth of about 19 inches. The slope range is 0 to 6 percent, but most of the acreage has slopes of about 2 percent or less. These soils are low in natural fertility and organic-matter content and are strongly acid.

Altavista soils are on benches just a few feet above the flood plain. They commonly are near Wickham soils but are less well drained and less red than those soils.

The acreage of Altavista soils is limited. The original vegetation consisted of oak, gum, hickory, and some pine. A large part of the acreage has been cleared and cultivated in the past, but now about half has reverted to loblolly pine and shortleaf pine mixed with hardwoods.

Altavista soils are suited to a fairly wide range of crops, and they respond well to fertilization.

Altavista sandy loam, 0 to 2 percent slopes (A1A).—This moderately well drained soil is on terraces along the larger streams of the county. The major horizons (described moist) are—

0 to 7 inches, brown, very friable sandy loam.
7 to 29 inches, yellowish-brown, friable sandy clay loam mottled with brownish yellow, light gray, and yellowish red below a depth of about 19 inches; weakly to moderately developed subangular blocky structure.
29 to 50 inches +, light yellowish-brown sandy clay mottled with light gray and reddish yellow.

The surface layer ranges from dark grayish brown to brown. The subsoil ranges from yellowish brown to strong brown in color and from fine sandy clay loam to sandy clay loam in texture. Generally, mottles are more than 14 inches below the surface, but in a few depressions there are mottles throughout the subsoil. In areas adjacent to Wickham soils, the depth to mottling is as much as 24 inches. Included in mapping were some areas in which the surface layer is fine sandy loam.

Surface runoff is slow, and erosion is not a problem. Permeability is moderate over most of the acreage but is slow in places. The available moisture capacity is medium. Overflow is rare.

This soil is easily worked and is suited to a fairly wide range of crops. It responds well to good management, especially fertilization. The acreage is small, and about 60 percent is cultivated or idle. (Capability unit I–2; woodland group 3; wildlife group 1)

Altavista sandy loam, 2 to 6 percent slopes (A1B).—This deep, moderately well drained soil has a dark grayish-brown to brown sandy loam surface layer that is 7 to 10 inches thick. Beneath this is yellowish-brown sandy clay loam mottled with light gray and yellowish red at a depth of 10 to 20 inches. The plow layer is entirely within the surface layer, except in a few included eroded spots.

Surface runoff is medium, and the erosion hazard is slight or moderate. Permeability is moderate. The available moisture capacity is medium.

This soil is easy to work, is suited to a fairly wide range of crops, and responds well to good management. The acreage is small. Most of it has been cultivated; now, about 50 percent is cultivated or pastured. (Capability unit IIe–2; woodland group 3; wildlife group 1)

Appling Series

The Appling series consists of well-drained soils that developed in material weathered from granite and gneiss. These soils are on the uplands. The surface layer is light yellowish-brown to grayish-brown loamy coarse sand. The subsoil is yellowish brown, strong brown, or mottled yellowish red and commonly is mottled with red in the lower half. The texture of the subsoil ranges from sandy clay loam in the upper part to clay in the lower part. The slope range is 2 to 10 percent, but slopes of less than 6 percent predominate. The depth to bedrock ranges from 5 to more than 25 feet. These soils are low in fertility and organic-matter content and are strongly acid.

Appling soils occur with Cecil, Louisburg, Vance, and Helena soils. Their subsoil is less red and more mottled than that of Cecil soils. They are deeper to bedrock than are Louisburg soils, which lack a thick, distinct subsoil. Appling soils have a less plastic subsoil than Helena soils and are better drained. In color they resemble Vance soils, which have a tougher, firmer, more plastic subsoil.

Appling soils are moderately extensive in the northwestern two-thirds of the county. The largest areas are in the vicinity of Bostwick, Fairplay, and Rutledge. The original vegetation consisted of red oak, white oak, post oak, dogwood, and some pine. Most of the acreage has been cleared and cultivated, and about 75 percent is still in cultivated crops or in pasture. Many farmers prefer Appling soils for growing cotton. Most of the abandoned fields are in loblolly pine and shortleaf pine.

Appling loamy coarse sand, 2 to 6 percent slopes, eroded (AzB2).—This well-drained soil of the uplands has these major horizons in the profile:

0 to 6 inches, yellowish-brown, very friable loamy coarse sand.
6 to 18 inches, yellowish-brown, friable sandy clay loam; a few red mottles in the lower part.
18 to 42 inches, strong-brown to yellowish-red, firm clay to sandy clay mottled with red; strongly to moderately developed subangular blocky structure.
42 to 70 inches, brown, red, and yellow, friable sandy clay loam.

The color of the surface layer ranges from gray to yellowish brown. Included in mapping were some areas in which the surface layer is coarse sandy loam. The color of the subsoil ranges from yellowish brown and strong brown to mottled yellowish red. The upper part of the subsoil, to a depth of 3 to 18 inches, is commonly sandy clay loam and is free of mottles. The lower part is finer textured, ranges from clay to sandy clay, and is generally mottled.

Rock outcrops in spots, and a few areas have quartz gravel on the surface. Some severely eroded areas are included, and in these the plow layer is sandy clay loam.

On most of the acreage, some of the upper subsoil has been mixed with the surface layer by plowing. In places there are a few shallow gullies.

Permeability is moderate, the available moisture capacity is low, and surface runoff is medium. The erosion hazard is slight or moderate.

This soil is easy to work, has a thick root zone, and is suited to a wide range of crops. Response to fertilization is excellent. The acreage is moderately extensive, and all of it has been cultivated. About half is now in crops, and the rest is used in about equal proportions for pasture and forest. (Capability unit IIe–2; woodland group 5; wildlife group 1)

Appling loamy coarse sand, 2 to 6 percent slopes (AzB).—This well-drained soil has a grayish-brown loamy coarse sand surface layer, 7 to 12 inches thick, over yellowish-brown light sandy clay loam. At a depth of about 12 to 20 inches is yellowish-brown to strong-brown clay mottled with red. The plow layer is within the surface layer, except in a few included eroded spots.

The available moisture capacity is low, permeability is moderate, and surface runoff is medium. Erosion is a slight or moderate hazard.

This soil has a thick root zone and can be cultivated within a fairly wide range of moisture content. It is suited to a wide range of crops. The total acreage is small, and about 80 percent is cultivated. Cotton is one of the chief crops. (Capability unit IIe–2; woodland group 5; wildlife group 1)

Appling loamy coarse sand, 6 to 10 percent slopes, eroded (AzC2).—This soil has a grayish-brown to yellowish-brown loamy coarse sand surface layer over yellowish-brown sandy clay loam. At a depth of about 8 to 16 inches, the subsoil becomes mottled and clayey. This soil is well drained and moderately permeable. Surface runoff is medium or rapid. The available moisture capacity is low. Included in mapping were a few severely eroded areas in which the plow layer is a yellowish-brown to red sandy clay loam, infiltration is slow, and runoff is moderately rapid.

This soil, except where severely eroded, is easy to work and has a thick root zone. The erosion hazard is moderate or severe, but under good management a wide range of crops and pasture plants can be grown. The acreage is small, and 65 percent of it is in forest. (Capability unit IIIe–2; woodland group 5; wildlife group 1)

Appling sandy clay loam, 2 to 6 percent slopes, severely eroded (AnB3).—The plow layer of this soil is yellowish-brown to yellowish-red sandy clay loam. Beneath it is yellowish-brown clay to sandy clay mottled with red. Included in mapping were some very severely eroded areas in which the surface layer is strong-brown to yellowish-brown sandy clay mottled with red. The original loamy coarse sand surface soil has been removed from most areas by erosion, but in places it was removed mechanically for use as road material. There are some shallow gullies and a few that are 2 to 3 feet deep.

Permeability is moderate or moderately slow, and the available moisture capacity is medium. The tilth is generally poor, and the plow layer bakes and hardens upon drying and is likely to be cloddy.

This soil is suited to a fairly wide range of crops, but because of medium or rapid surface runoff, erosion is a moderate or severe hazard. The total acreage is small, and most of it is idle or in forest. (Capability unit IIIe–2, woodland group 4; wildlife group 3)

Appling sandy clay loam, 6 to 10 percent slopes, severely eroded (AnC3).—The 5- to 7-inch plow layer of this soil is yellowish-brown to yellowish-red sandy clay loam. Beneath it is yellowish-brown clay to sandy clay mottled with red. In the very severely eroded areas that were included in mapping, mottled strong-brown to yellowish-brown sandy clay is at the surface. Practically all of the original loamy coarse sand surface soil has been removed from most of this soil by erosion. In some areas it was moved mechanically for use as road material. Shallow gullies are common, and there are a few gullies that are 3 to 6 feet deep.

The tilth is generally poor, and the plow layer bakes and hardens upon drying and is likely to be cloddy. Permeability is moderate, the available moisture capacity is moderately low, and surface runoff is moderately rapid.

Because of the severe hazard of erosion, this soil is suited only to limited cultivation; it is better suited to use as pasture. The acreage is small, and most of it is in forest or pasture. (Capability unit IVe–1; woodland group 4; wildlife group 3)

Cecil Series

The Cecil series consists of deep, well-drained soils that developed in material weathered chiefly from granite gneiss, granite, and schist. These soils are on the uplands. Where not severely eroded, the surface layer generally is dark yellowish-brown sandy loam. The subsoil is red and clayey. The slope range is 2 to 25 percent, but slopes of less than 10 percent predominate. Depth to bedrock ranges from 3 to 30 feet but generally is more than 5 and less than 15 feet. The soils are strongly acid, medium to low in fertility, and low in organic-matter content.

Cecil soils are among Appling, Lloyd, and Louisburg soils on broad interstream ridges and valley slopes. They have redder subsoil than Appling soils. As compared with Louisburg soils, which commonly lack a well-developed subsoil, Cecil soils are deeper to bedrock and their horizons are more distinct. They generally are less red than Lloyd soils, which developed from mixed acidic and basic rocks.

Cecil soils cover 45 percent of the county and occur in all parts. The original vegetation consisted chiefly of white oak, post oak, red oak, blackjack oak, hickory, and some dogwood, sweetgum, poplar, and shortleaf pine. Most of the acreage has been cleared and cultivated at some time in the past, but now about 40 percent of it is wooded.

Cecil soils are suited to a wide range of locally grown crops and pasture plants. Abandoned fields commonly revert to loblolly pine and shortleaf pine.

Cecil sandy loam, 2 to 6 percent slopes, eroded (CyB2).—This is a deep, well-drained soil that has red clayey subsoil. The major horizons in the profile are—

0 to 8 inches, dark yellowish-brown, very friable sandy loam.
8 to 40 inches, red, firm clay loam to clay; moderately developed subangular blocky structure.
40 to 60 inches, highly weathered material that breaks down to sandy clay loam.

The surface layer is commonly dark yellowish brown, but in many cultivated fields it is yellowish red to light

reddish brown. The subsoil is red. In places its texture is sandy clay. Included in mapping were some small areas that have reddish-brown subsoil, a few areas in which the lower part of the subsoil is mottled with reddish yellow, and some severely eroded areas in which the surface layer is red sandy clay loam. Some areas have angular quartz gravel on the surface.

This soil has a thick root zone and is easy to work within a wide range of moisture content. It is suited to a wide range of crops, and it responds well to good management, especially fertilization. Erosion is a slight or moderate hazard. Permeability is moderate, and the available moisture capacity is medium.

This is one of the most extensive soils in the county. Practically all of the acreage has been cultivated in the past. Now, about half is cultivated, 30 percent is pastured, and the rest is wooded or idle. (Capability unit IIe–1; woodland group 2; wildlife group 1)

Cecil sandy loam, 2 to 6 percent slopes (CYB).—This is a deep, well-drained soil that has a dark grayish-brown to yellowish-brown sandy loam surface layer, 7 to 14 inches thick, and red clayey subsoil. The plow layer is entirely within the surface layer, except in a very few thin spots. Some areas have angular quartz gravel on the surface. The plow layer has good tilth. The root zone is thick. The available moisture capacity is medium, and permeability is moderate.

This soil is suited to a wide range of crops and pasture plants. Erosion is a slight or moderate hazard. The acreage is not extensive. About half of it is used for crops and the rest for forest. (Capability unit IIe–1; woodland group 2; wildlife group 1)

Cecil sandy loam, 6 to 10 percent slopes, eroded (CYC2).—This well-drained soil has a yellowish-brown to light reddish-brown sandy loam plow layer 4 to 7 inches thick. The plow layer generally extends into the yellowish-red to red clayey subsoil. A few severely eroded areas are included, and in these the surface soil is yellowish-red sandy clay loam. There are a few shallow gullies and also a few deep ones. The root zone is thick. The tilth is good, except in the severely eroded areas. The available moisture capacity is medium, and permeability is moderate.

If well managed, this soil is suited to a wide range of crops. It responds well to fertilization and liming. Because of medium or rapid surface runoff, erosion is a moderate or severe hazard. The total acreage is small. Practically all of it has been cultivated in the past, but now about 50 percent is in pasture, 15 percent is cultivated, and the rest is idle or forested. (Capability unit IIIe–1; woodland group 2; wildlife group 1)

Cecil sandy loam, 10 to 15 percent slopes, eroded (CYD2).—This well-drained soil has a yellowish-brown to light reddish-brown sandy loam surface layer 3 to 9 inches thick. Beneath this is 3 to 6 inches of yellowish-red to red sandy clay loam grading to clay or sandy clay. This is generally a deep soil, but in less than 5 percent of the acreage the solum is only about 20 inches thick. Some severely eroded areas, in which the plow layer is sandy clay loam, were included in mapping. Also included were small areas of Louisburg soils. There are some shallow gullies and a few deep ones.

Surface runoff is rapid, and the erosion hazard is severe or very severe. The available moisture capacity is medium, and permeability is moderate. The root zone is generally thick.

This soil can be cultivated occasionally if well managed. It is suited to a fairly wide range of crops. The total acreage is small, and practically all of it is in forest. (Capability unit IVe–1; woodland group 2; wildlife group 2)

Cecil sandy loam, 15 to 25 percent slopes, eroded (CYE2).—This well-drained soil has a yellowish-brown to brown sandy loam surface layer 3 to 8 inches thick. Beneath this is 3 to 6 inches of yellowish-red to red sandy clay loam grading to clay or sandy clay. This is a moderately deep soil, but in less than 5 percent of the acreage the solum is only about 20 inches thick. Some severely eroded areas in which the surface layer is sandy clay loam were included in mapping. Also included were a few small areas that have never been cultivated, in which the surface soil still is mostly in place; small areas of Louisburg soils; and a few small areas in which the slope range is 25 to 35 percent. There are a few boulders on the surface and a few rock outcrops. In a few areas schist fragments and mica flakes are common in the profile.

Surface runoff is very rapid, and the erosion hazard is very severe; consequently, this soil is unsuited to crops. The acreage is moderately extensive. Almost all of it was cultivated, but now 97 percent is forested and the rest is pastured. (Capability unit VIe–2; woodland group 2; wildlife group 2)

Cecil sandy clay loam, 2 to 6 percent slopes, severely eroded (CZB3).—This soil has a yellowish-red to reddish-brown sandy clay loam plow layer, 5 to 7 inches thick, that consists largely of original subsoil material. Beneath the plow layer is 15 to 40 inches of firm, red clay. Some very severely eroded areas, in which the surface layer is red clay, were included in mapping. Shallow gullies and galled spots are common, and there are a few gullies 2 to 5 feet deep.

The tilth is generally poor. When dry, the plow layer tends to break up into clods if it has been plowed or grazed too wet. Surface runoff is medium or rapid, and permeability is moderate. The available moisture capacity is medium or low, and the erosion hazard is moderate or severe. The root zone is thick.

This is the most extensive soil in the county. It is suited to a wide range of crops. Nearly all of the acreage has been cultivated, but now some has reverted to loblolly pine and shortleaf pine, and about 59 percent is cultivated or pastured. (Capability unit IIIe–1; woodland group 4; wildlife group 3)

Cecil sandy clay loam, 6 to 10 percent slopes, severely eroded (CZC3).—This soil has a yellowish-red to reddish-brown sandy clay loam plow layer, 4 to 6 inches thick, that consists largely of original subsoil material. Below the plow layer is 12 to 38 inches of firm, red clay. Some very severely eroded areas, in which the surface layer is clay, were included in mapping. Shallow gullies are common, and a few gullies are 2 to 5 feet deep.

The tilth is generally poor; the plow layer forms large clods if plowed when too dry or if plowed or grazed when too wet. Permeability is moderate, and the available moisture capacity is medium. Surface runoff is rapid, and the erosion hazard is severe. The root zone is fairly thick.

This is the second most extensive soil in the county. Practically all of the acreage has been cultivated, but now 61 percent has reverted to shortleaf pine and loblolly pine. The rest is cultivated, pastured, or idle. (Capability unit IVe–1; woodland group 4; wildlife group 3)

Cecil sandy clay loam, 10 to 15 percent slopes, severely eroded (CZD3).—This soil generally occurs on valley slopes between the gentle slopes of the ridgetops and the stream bottoms. The surface layer is yellowish-red to reddish-brown sandy clay loam. Below this is 10 to 26 inches of firm, red clay. In some very severely eroded areas that were included in mapping, the surface layer is clay. There are a few shallow gullies and a few gullies deep enough to penetrate the friable, partly weathered rock material. In a few areas schist fragments and mica flakes are common in the profile.

This soil is poorly suited to cultivated crops. Surface runoff is rapid, and erosion is severe. Permeability is moderate, and the available moisture capacity is low. The acreage is extensive. It has all been cultivated, but now 92 percent has reverted to forest and the rest is in pasture and crops. (Capability unit VIe–2; woodland group 4; wildlife group 4)

Cecil sandy clay loam, 15 to 25 percent slopes, severely eroded (CZE3).—This soil generally occurs on valley slopes next to the stream bottoms. Practically all of the original surface layer and some of the subsoil have been removed by erosion. The present surface layer is yellowish-red to reddish-brown sandy clay loam or, in places, clay. It consists mostly of material that was originally part of the subsoil. Shallow gullies are common, and there are a few deep ones. A few places between gullies still have a thing sandy loam surface layer. Mica flakes and schist fragments are common in places. Included in mapping were a few areas where the slope range is 25 to 35 percent.

This soil is not suited to cultivation. Permeability is moderate, and the available moisture capacity is medium or low. Surface runoff is very rapid. The tilth is poor, and the root zone is thin. The acreage is small. Practically all of this soil has been cultivated, but now all has reverted to forest. (Capability unit VIIe–1; woodland group 4; wildlife group 4)

Cecil-Gullied land complex, 2 to 6 percent slopes (CZB4).—All of the original surface soil and some of the subsoil have been removed from most of this complex. The color of the present surface layer ranges from red to reddish brown. The texture is mostly sandy clay loam, but in some areas it is clay. Beneath the surface layer is 10 to 30 inches of firm, red clay. Most of the acreage is dissected by an intricate pattern of shallow gullies and some deep gullies. A few deep ones cut into the friable, partly weathered rock material. The surface layer of the soil between the gullies consists mostly of original subsoil material. There are a few areas from which all of the surface soil and about half of the subsoil have been removed by mechanical means for use as road material.

This complex is suited to only a narrow range of crops. It has poor tilth, low available moisture capacity, and moderate permeability. The root zone is fairly thick. Reclamation and renovation are usually necessary before cultivated crops can be grown. The erosion hazard is severe. Unless these areas are stabilized, they produce a large volume of sediment. The total acreage is small. Practically all of it has been cultivated, but now 86 percent is in forest and the rest is in pasture or is idle. (Capability unit IVe–1; woodland group 4; wildlife group 4)

Cecil-Gullied land complex, 6 to 10 percent slopes (CZC4).—All of the original surface layer and most of the subsoil have been removed from these areas, either by erosion or by mechanical means. The present surface layer is red to reddish-brown sandy clay loam and is made up mostly of material that was originally the lower part of the subsoil. Below this is 10 to 28 inches of firm, red clay. Most of the acreage is dissected by shallow and deep gullies, and some gullies have cut into the friable, partly weathered rock. The surface layer of the soil between the gullies consists mostly of original subsoil material.

This complex is poorly suited to cultivated crops. It has poor tilth, low available moisture capacity, and moderate permeability. The root zone is thin. The erosion hazard is very severe. Unless these areas are stabilized, they produce a large amount of sediment. Reclamation and renovation are generally necessary before they can be pastured. The acreage is extensive, and practically all of it has been cultivated. Most is now in forest. Less than 1 percent is cultivated or pastured. (Capability unit VIe–2; woodland group 4; wildlife group 4)

Cecil-Gullied land complex, 10 to 15 percent slopes (CZD4).—This complex consists of areas from which erosion has removed all of the original surface layer and most of the subsoil. The present surface layer is red to reddish-brown sandy clay loam and generally consists mostly of material that was originally part of the subsoil. In some areas the surface layer is clay. Beneath the surface layer is 8 to 24 inches of firm, red clay. Gullies are common, and some have cut into the partly weathered rock material. In a few small areas rock is exposed at the surface. Mica flakes and schist fragments are common in a few places.

This complex is not suited to cultivated crops. The tilth is poor, and the root zone is thin. Surface runoff is rapid. Permeability is moderate, and the available moisture capacity is low. (Capability unit VIIe–1; woodland group 4; wildlife group 4)

Chewacla Series

The Chewacla series consists of deep, somewhat poorly drained or moderately well drained soils that are developing in recent alluvium on nearly level flood plains. The surface layer ranges from brown to dark reddish-brown silt loam. Beneath this is reddish-brown to dark-brown silty clay loam that is mottled at a depth of 12 to 30 inches. These soils are medium to low in natural fertility, low to medium in organic-matter content, and medium to strongly acid.

Chewacla soils occur with Congaree and Wehadkee soils and Alluvial land, moderately wet. They are less well drained than Congaree soils, which are mottle free to a depth of 30 inches or more. They are more uniform in color and texture than Alluvial land, moderately wet, which is stratified. They are better drained than Wehadkee soils, which are mottled to the surface.

Chewacla soils are moderately extensive in this county. They make up sizable areas along several streams, but the

largest acreage is along Sugar Creek. The original vegetation consisted of water-tolerant hardwoods, such as alder, willow, water oak, and white oak, and a little pine. Much of the acreage has been cleared, ditched, and cultivated, but because of annual overflow and poor drainage outlets, about 85 percent of it has been allowed to grow up in willow, sweetgum, water oak, and some pine.

Chewacla silt loam (0 to 2 percent slopes) (Csl).—This is a deep, somewhat poorly drained or moderately well drained soil on flood plains. The major horizons in the profile are—

0 to 7 inches, dark reddish-brown, friable silt loam.
7 to 33 inches, reddish-brown to dark-brown, friable silty clay loam mottled with light yellowish brown.
33 to 50 inches +, light olive-gray to gray silty clay loam mottled with olive and yellowish brown. In places this layer is below the water table.

The surface layer ranges from brown to dark reddish brown in color. Its texture in some areas is silty clay loam. The depth to mottling is ordinarily about 14 inches but ranges from 12 to 30 inches. Small areas of Wehadkee soils and Alluvial land, moderately wet, were included in mapping.

This soil has slow surface runoff and moderate or slow permeability. The available moisture capacity is high. The plow layer has good tilth. Suitable pasture plants and crops are chiefly water-tolerant species. Ditching is required to remove excess surface water and to improve internal drainage. The acreage is moderately extensive, and 85 percent of it is in forest. (Capability unit IIIw–2; woodland group 9; wildlife group 8)

Colfax Series

The Colfax series consists of somewhat poorly drained soils in slight depressions, around the head of drains, and on toe slopes. These soils have a dark yellowish-brown to brown sandy loam surface layer and mottled brownish-yellow sandy clay loam subsoil. They developed in material weathered from granite and granite gneiss. Depth to solid rock ranges from 4 to 18 feet but in most places is less than 12 feet. The slope range is 2 to 6 percent. These soils are low in natural fertility and organic-matter content, and are strongly acid.

Colfax soils occur as small areas, mostly in the northwestern quarter of the county, with Cecil and Appling soils and in places with Worsham soils. Colfax soils are not so well drained as Cecil and Appling soils. They are better drained than Worsham soils, which have a gleyed subsoil.

The original vegetation consisted chiefly of sweetgum, white oak, red oak, blackjack oak, and some pine. Most of the acreage has been cleared in the past but is now used in about equal proportions for crops, pasture, forest, and idle land.

Colfax sandy loam, 2 to 6 percent slopes (CiB).—This is a deep, somewhat poorly drained soil in slight depressions, around the head of drains, and on toe slopes. The major horizons in the profile are—

0 to 6 inches, brown, very friable sandy loam.
6 to 28 inches, brownish-yellow, friable sandy clay loam; firm; mottled in lower half with red, light yellowish brown, and strong brown; weakly to moderately developed blocky structure.
28 to 40 inches, yellowish-brown, friable clay loam mottled with red and pale olive.
40 to 52 inches, chiefly gray sandy clay to clay; small pockets of red, sandy material.

The surface layer is dark yellowish-brown to brown sandy loam, and the subsoil is mottled olive to yellowish-brown sandy clay loam and clay loam. The depth to mottling ranges from 6 to 22 inches but ordinarily is less than 12 inches. Small areas in which the surface layer is coarse sandy loam or silt loam were included in mapping. Also included were some areas that have 3 to 6 inches of overwash on the surface. Mica flakes are common.

This soil is easy to work, but it dries out and warms up slowly in spring. It is limited in its suitability for crops but is well suited to most pasture plants. Permeability is slow, and the available moisture capacity is medium. Because of wetness, surface runoff is slow and at times water is ponded in places. About equal acreages are in crops, pasture, forest, and idle land. (Capability unit IIIw–3; woodland group 6; wildlife group 8)

Congaree Series

The Congaree series consists of deep, well-drained, loamy soils that developed in recent alluvium on nearly level flood plains. The alluvial deposit ranges from 30 inches to several feet in thickness. The surface layer, to a depth of about 18 inches, commonly is brown to dark-brown silt loam. Beneath this is dark-brown, yellowish-brown, and yellowish-red silty clay loam. These soils are mottle free to a depth of 30 inches or more. They are low in organic-matter content, low or medium in natural fertility, and medium or strongly acid.

Congaree soils occur with Chewacla soils and Alluvial land. They are better drained than Chewacla soils, which are mottled within 12 to 30 inches of the surface. They are more uniform in color and texture than Alluvial land, which is stratified.

The acreage of Congaree soils is limited. The largest areas are along North Sugar Creek. The original vegetation consisted of oak, hickory, beech, alder, and gum. Practically all of the acreage has been cleared and cultivated at some time in the past, but now slightly more than half has reverted to forest. Good drainage, good tilth, and high available moisture capacity make Congaree soils some of the most productive in the county. Most locally grown crops are suitable.

Congaree silt loam (0 to 2 percent slopes) (Con).—This is a productive, deep, well-drained soil on flood plains. The major horizons in the profile are—

0 to 18 inches, brown to dark-brown, friable silt loam.
18 to 36 inches, dark-brown to yellowish-red, friable silty clay loam.
36 to 48 inches +, mottled reddish-brown, friable silty clay loam.

The surface layer ranges from dark grayish brown to reddish brown in color. Some areas in which the surface layer is fine sandy loam or silty clay loam were included in mapping. Also included were a few areas upon which recent floods have deposited sandy material; a few areas that have strata of sand in the profile; and a few areas of Chewacla soils, which generally are at slightly lower elevations next to the hills.

This moderately extensive soil is easy to work. The root zone is thick. The available moisture capacity is high, runoff is slow, and permeability is moderate. Although local areas are flooded occasionally, this soil is suited to most crops, except cotton and peaches, and to pasture plants. Fields commonly are well shaped and large enough for use of heavy farm machinery. (Capability unit IIw–2; woodland group 1; wildlife group 7)

Davidson Series

The Davidson series consists of soils that have a dark reddish-brown loamy surface layer and dark-red clayey subsoil. These soils are deep and well drained. They formed in residuum from basic rocks, chiefly hornblende gneiss, hornblende schist, and diorite. The depth to bedrock is commonly more than 15 feet. The slope range is 2 to 15 percent, but slopes of less than 6 percent predominate. These soils are medium in fertility, low in organic-matter content, and medium acid or strongly acid.

Davidson soils are extensive in the southern part of the county and generally are surrounded by Lloyd soils. They have a darker reddish-brown and less sandy surface layer and generally darker red subsoil than Lloyd soils, which were derived from mixed basic and acidic rocks.

The native vegetation consisted of oak, hickory, poplar, sassafras, dogwood, cedar, and some pine. Most of the acreage has been cleared and cultivated at some time, but many of the severely eroded fields have reverted to loblolly pine and shortleaf pine.

Davidson soils are suited to a wide range of crops. About half of the acreage is cultivated or pastured.

Davidson loam, 2 to 6 percent slopes, eroded (DgB2).—This is a well-drained, dark-red soil on the uplands. The major horizons in the profile are—

0 to 7 inches, dark reddish-brown, friable or firm loam.
7 to 72 inches, dark-red, firm clay; moderately developed subangular blocky structure; small black manganese concretions, which increase in number with depth.
72 to 96 inches, clay loam material derived from basic rock.

The subsoil ranges from dark red to dusky red in color. Included in mapping were some areas in which the surface layer is dark-brown sandy loam to sandy clay loam and is 7 to 12 inches thick, and some severely eroded areas in which the surface layer is dark reddish-brown clay and clay loam.

This soil has a thick root zone. It is somewhat difficult to till, because it sticks to the plow and is very slick when wet. Permeability is moderate, and the available moisture capacity is medium. Surface runoff is medium. There is a slight or moderate erosion hazard in cultivated areas.

This soil is suited to a wide range of crops and pasture plants, and it responds well to lime and fertilization. It is moderately extensive, and about half the acreage is cultivated. (Capability unit IIe–1; woodland group 2; wildlife group 1)

Davidson clay loam, 2 to 6 percent slopes, severely eroded (DhB3).—This soil has a dark reddish-brown clay loam plow layer consisting largely of material that was originally part of the subsoil. Beneath this is dark reddish-brown to dark-red clay several feet thick. Included in mapping were some very severely eroded areas in which the surface layer is clay. Shallow gullies are common, and there are a few gullies 2 to 4 feet deep.

This soil is difficult to cultivate when wet because it sticks to the plow. It has a thick root zone. The available moisture capacity is medium, and permeability is moderate. The erosion hazard is moderate or severe.

This soil is suited to a wide range of crops and pasture plants and is very productive under good management. It is moderately extensive. Nearly all of the acreage has been cultivated in the past, but about one-third has reverted to loblolly pine and shortleaf pine. (Capability unit IIIe–1; woodland group 4; wildlife group 3)

Davidson clay loam, 6 to 10 percent slopes, severely eroded (DhC3).—This soil has a dark reddish-brown clay loam plow layer consisting largely of material that was originally part of the subsoil. Erosion has removed all or nearly all of the original surface layer. Beneath the plow layer is dark reddish-brown to dark-red clay several feet thick. Included in mapping were some very severely eroded areas in which the surface layer is clay. There are some shallow and some deep gullies.

This soil is difficult to cultivate because it sticks to the plow. It has a thick root zone. The available moisture capacity is medium, and permeability is moderate. Runoff is moderately rapid, and consequently the erosion hazard is severe.

This soil is suited to a moderately wide range of crops and is well suited to pasture plants and forest. It is moderately extensive. Most of the acreage has been cultivated in the past, but about two-thirds has reverted to loblolly pine and shortleaf pine. (Capability unit IVe–1; woodland group 4; wildlife group 3)

Davidson clay loam, 10 to 15 percent slopes, severely eroded (DhD3).—This soil has a dark reddish-brown clay loam surface layer consisting largely of material that was originally part of the subsoil. Erosion has removed nearly all of the original surface layer. Beneath the surface layer is dark reddish-brown or dark-red clay several feet thick. Included in mapping were some very severely eroded areas in which the surface layer is clay, and a few areas that have a thin loam surface soil and a slope of 15 to 30 percent. In places rounded basic stones are on the surface. There are some shallow and some deep gullies.

This soil is difficult to till because of its strong slope and poor tilth, but it responds well to good management, including fertilization. It is suited to a wide range of crops, but rapid runoff and the severe hazard of erosion limit its use for cultivation. It is well suited to pasture. The acreage is moderately extensive, and about 90 percent of it is in forest. (Capability unit IVe–1; woodland group 4; wildlife group 4)

Gullied Land (Gul)

This land type consists of areas in which the soil profile has been destroyed by erosion. Some abandoned roads and borrow pits on strong slopes are now mostly deep gullies that cut into the partly weathered rock material. Some of these gullies are as much as 50 feet wide and 20 feet deep. Included are some abandoned fields that are dissected by an intricate pattern of deep gullies and cannot be used for crops or pasture. Most of this land type is in forest. Some is idle, except for a few stunted trees. (Capability unit VIIe–4; woodland group, none; wildlife group 4)

Helena Series

The Helena series consists of somewhat poorly drained or moderately well drained soils that have a dark grayish-brown sandy loam surface layer and mottled brownish-yellow to strong-brown, firm clayey subsoil. These soils are on the uplands. They developed in material weathered predominantly from acidic rocks, chiefly aplitic granite and gneiss, and to a lesser extent from basic rocks. They are mostly on the lower part of slopes. "Wet weather" springs are common. The slope range is 2 to 10 percent. The depth to bedrock is 5 to 15 feet. These soils are low in natural fertility and organic-matter content and are strongly acid throughout the profile.

Helena soils occur with Vance, Appling, and Wilkes soils. Gray mottles are commonly found throughout the subsoil of Helena soils and in the lower part of the Vance subsoil but are lacking in the Appling subsoil. The subsoil of Helena soils ranges in color from yellow to strong brown, and the subsoil of Vance soils from strong brown to red. Helena soils are less well drained and have a less permeable subsoil than Appling soils, which are moderately permeable. As compared with Wilkes soils, which were derived from mixed basic and acidic rocks, Helena soils are deeper to bedrock and their horizons are more distinct.

The total acreage of Helena soils is small. The original forest consisted of blackjack oak, post oak, white oak, red oak, willow oak, a little sweetgum, and shortleaf pine. All of the acreage has been cultivated, but now about half of it has reverted to forest.

Helena sandy loam, 2 to 6 percent slopes, eroded (HYB2).—This is a somewhat poorly drained to moderately well drained soil that has firm clayey subsoil. This soil is on the uplands. The major horizons in the profile are—

0 to 6 inches, dark grayish-brown, very friable sandy loam.
6 to 37 inches, mottled brownish-yellow sandy clay to clay; hard when dry and plastic when wet; strongly developed angular blocky structure.
37 to 42 inches, mottled yellow and gray, partially weathered rock material that breaks down to sandy clay loam.

The surface layer ranges from dark grayish brown to gray in color. Included in mapping were a few areas of coarse sandy loam and some severely eroded areas in which the surface layer is sandy clay loam. The subsoil ranges from brownish yellow to strong brown in color and from sandy clay to clay in texture. It is mottled throughout with red, brown, and gray. Shallow gullies have formed in some places, and there are a few deep ones.

This soil is easy to work, except in severely eroded areas, and it is suited to a fairly wide range of crops. It warms up slowly in spring. The available moisture capacity is medium, and permeability is moderately slow or slow. The root zone is moderately thick. There is a slight or moderate erosion hazard because of medium surface runoff. The total acreage of this soil is small. About 85 percent is cultivated or pastured. The rest is wooded. (Capability unit IIe–4; woodland group 6; wildlife group 5)

Helena sandy loam, 6 to 10 percent slopes, eroded (HYC2).—This soil is on the uplands. It is somewhat poorly drained or moderately well drained and has firm clayey subsoil. The surface layer is dark grayish-brown to brown sandy loam and is 3 to 10 inches thick. Included in mapping were a few severely eroded areas in which the surface layer is sandy clay loam. The subsoil ranges from brownish yellow to strong brown in color and from sandy clay to clay in texture. It is mottled throughout with red, brown, and gray. Shallow gullies have formed in some places, and there are a few deep ones.

This soil is easy to work, except in severely eroded areas, and is suited to a fairly wide range of crops. The root zone is moderately thick. Permeability is moderately slow or slow, and the available moisture capacity is medium. The erosion hazard is moderate or severe.

The acreage is small, and 75 percent is in forest. The rest is cultivated or pastured. (Capability unit IVe–2; woodland group 6; wildlife group 5)

Helena sandy clay loam, 2 to 6 percent slopes, severely eroded (HZB3).—The plow layer of this soil is yellow to strong-brown sandy clay loam and is 5 to 7 inches thick. Included in mapping were some very severely eroded areas in which the surface layer is sandy clay or clay. The original surface soil has been removed from most of the acreage by erosion, and there are some shallow gullies and a few deep ones. The subsoil is brownish-yellow to strong-brown sandy clay and clay mottled with grayish brown and red. It is 8 to 20 inches thick.

This soil is difficult to work and is suited to a limited range of crops. The root zone is moderately thick. Permeability is moderately slow or slow, and the available moisture capacity is medium. Because of rapid surface runoff, erosion is a severe hazard.

The total acreage of this soil is small. Although most of it has been cultivated, more than half is now idle, and the rest is used in about equal proportions for pasture, woods, and cultivated crops. (Capability unit IVe–2; woodland group 7; wildlife group 5)

Helena sandy clay loam, 6 to 10 percent slopes, severely eroded (HZC3).—The 4- to 6-inch plow layer of this soil is yellow to strong-brown sandy clay loam. In the very severely eroded areas that were included in mapping, mottled sandy clay or clay is at the surface. Practically all of the original surface soil has been removed from most of this soil by erosion. Shallow gullies are common, and there are a few deep ones. The subsoil is brownish-yellow to strong-brown sandy clay and clay mottled with gray, brown, and red. It is 7 to 18 inches thick.

This soil is difficult to work and is not suited to cultivated crops. The root zone is moderately thick to thin. Permeability is moderately slow or slow, and the available moisture capacity is medium. Because of very rapid surface runoff, erosion is a very severe hazard.

The total acreage of this soil is small, and most of it has been cultivated. Now the acreage is used in about equal proportions for forest, crops, and pasture. (Capability unit VIe–4; woodland group 7; wildlife group 5)

Iredell Series

The Iredell series consists of moderately well drained or somewhat poorly drained soils that have an olive-brown sandy loam surface layer and very plastic and sticky clay subsoil. These soils developed from dark-colored basic rocks, such as diorite, gabbro, and hornblende gneiss. The depth to bedrock is 3 to 6 feet. The slope range is 2 to 6 percent. These soils are medium in natural fertility, low in organic-matter content, and medium acid.

Iredell soils commonly are surrounded by Lloyd and Davidson soils. Their brownish, very plastic and sticky subsoil distinguishes them from Lloyd and Davidson soils, which have red or dark-red and much less plastic subsoil.

The total acreage of Iredell soils is very small; most of the acreage is in the southeastern part of the county. The original vegetation consisted of oak, hickory, poplar, sassafras, dogwood, cedar, and some pine. About a third of the acreage is used for pasture, corn, and cotton, and the rest is wooded. Because of the very plastic, tough clay subsoil, these soils have a limited root zone and consequently are not suitable for some plants.

Iredell sandy loam, 2 to 6 percent slopes (IbB).—This is a moderately well drained or somewhat poorly drained upland soil that has very slowly permeable clay subsoil. The major horizons in the profile are—

0 to 7 inches, olive-brown, friable sandy loam.
7 to 21 inches, dark yellowish-brown and light olive-brown, very plastic clay; strongly developed angular blocky structure.
21 to 38 inches +, clay and partially weathered material from basic rocks.

Included in mapping were a few small eroded areas and a few small depressions where water accumulates after each rain.

The surface layer of this soil is fairly easy to work, but it is thin in spots, and the clay subsoil is difficult to penetrate with implements. The subsoil is plastic and fine textured, and it shrinks and cracks when dry and swells and is very sticky when wet.

The available moisture capacity is medium. Because of the tough subsoil, permeability is very slow, surface runoff is medium or moderately rapid, and the erosion hazard is moderate.

If well managed, this soil produces good yields of crops and pasture. It responds well to fertilizer and lime. The acreage is very small. About 65 percent is forested, 25 percent is cultivated, and 10 percent is pastured. (Capability unit IIe–4; woodland group 7; wildlife group 5)

Lloyd Series

The Lloyd series consists of deep, well-drained soils that have a brown or reddish-brown sandy loam surface layer and red to dark-red clay and clay loam subsoil. These soils are on the uplands. They formed in material weathered from basic and acidic rocks, chiefly diorite, hornblende gneiss, granite gneiss, granite, and basic schist. The depth to bedrock is commonly more than 15 feet. The slope range is 2 to 25 percent, but slopes are ordinarily less than 15 percent. These soils are medium or low in natural fertility, low in organic-matter content, and medium acid or strongly acid.

Lloyd soils are extensive and occur throughout the county with Cecil and Davidson soils. They have a darker brown surface layer and darker red subsoil than Cecil soils, which formed from acidic rocks. Lloyd soils have a sandier and lighter colored surface soil than Davidson soils, which formed primarily from basic rocks.

The native vegetation consisted chiefly of red oak, white oak, post oak, hickory, shortleaf pine, and loblolly pine. Most of the acreage has been cleared and cultivated, but now about half is wooded, one-third is in pasture, and the rest is cultivated.

Lloyd sandy loam, 2 to 6 percent slopes, eroded (LdB2).—This is a deep, well-drained soil that formed in material weathered from a mixture of basic and acidic rocks. The major horizons in the profile are—

0 to 6 inches, reddish-brown, very friable sandy loam.
6 to 44 inches, dark-red to red, firm clay; moderately developed subangular blocky structure; clay loam in the uppermost and the lowest few inches; some mica flakes and a few black manganese concretions in the lower part.
44 to 60 inches +, mottled, reddish, partly weathered material that breaks down to clay loam.

The color of the surface layer ranges from brown to dark reddish brown. In some areas the subsoil is red, reddish-brown, or dark-red clay loam in the upper part and dark-red or red clay in the lower part. In other areas its texture is sandy clay loam in the upper part and clay loam in the lower part. Included in mapping were some severely eroded areas in which the plow layer is reddish-brown to weak-red clay loam. Also included were areas in which Cecil soils are mixed in an intricate pattern with Lloyd soils. There are a few shallow gullies and also a few deep ones. Some areas have angular pebbles of quartz, granite gneiss, or basic rock on the surface.

This soil has a thick root zone and is easy to work within a fairly wide range of moisture content. It is suited to a wide range of crops and responds well to good management, especially fertilization. Erosion is a slight or moderate hazard. Permeability is moderate, and the available moisture capacity is medium.

This soil is extensive. Practically all of the acreage has been cultivated, and now about 75 percent is cultivated or pastured. Most of the rest is in forest of loblolly pine and shortleaf pine. (Capability unit IIe–1; woodland group 2; wildlife group 1)

Lloyd sandy loam, 6 to 10 percent slopes, eroded (LdC2).—This is a deep, well-drained soil that has a brown to reddish-brown sandy loam plow layer 4 to 9 inches thick. This layer generally extends into the red to dark-red clayey subsoil, and some of the clay has been mixed with the surface soil. In a few severely eroded areas that were included in mapping, the surface layer is reddish-brown to weak-red clay loam. There are a few shallow gullies and also a few deep ones.

This soil is easy to work, except that in severely eroded areas it is sticky when wet. It has a thick root zone. If well managed, it is suited to a wide range of crops. Because of medium or rapid surface runoff, however, erosion is a moderate or severe hazard. Permeability is moderate, and the available moisture capacity is medium.

The total acreage of this soil is small. Practically all of it has been cultivated, but now about half is wooded and the rest is pastured or idle. (Capability unit IIIe–1; woodland group 2; wildlife group 1)

Lloyd sandy loam, 10 to 15 percent slopes, eroded (LdD2).—This well-drained soil has a dark-brown to reddish-brown sandy loam plow layer that is 3 to 9 inches thick. Beneath this is a layer of red to dark-red clayey subsoil. In some severely eroded areas that were included in mapping, the plow layer is red to weak-red clay loam. Also included were a few small wooded areas that had not been cultivated, in which the surface layer is very dark brown. In areas that have been cultivated, the plow layer generally extends into the clayey subsoil and some of the clay has been mixed with the surface soil.

There are a few shallow gullies and also a few deep ones. Surface runoff is rapid, and the erosion hazard is severe or very severe. The available moisture capacity is medium, and permeability is moderate. The root zone is generally thick.

This soil is suited to a fairly wide range of crops. If it is well managed, cultivated crops can be grown occasionally. The total acreage is small, and most of it is in forest. (Capability unit IVe–1; woodland group 2; wildlife group 2)

Lloyd clay loam, 2 to 6 percent slopes, severely eroded (LeB3).—This soil has a reddish-brown to weak-red clay loam plow layer, 5 to 7 inches thick, that consists largely of original subsoil material. Beneath this is a layer of red to dark-red clay to clay loam 17 to 60 inches thick. Shallow gullies are common, and there are a few gullies 2 to 4 feet deep. In some very severely eroded areas that were included in mapping, all of the original surface soil has been removed and there is an intricate pattern of shallow and deep gullies.

This soil is hard to work because it sticks to the plow. Surface runoff is medium or rapid. Permeability is moderate, and the available moisture capacity is medium. The erosion hazard is moderate or severe. The root zone is thick. A wide range of crops can be grown.

This soil is extensive, and nearly all of the acreage has been cultivated. Now 60 percent is cultivated and pastured, and the rest is forested. (Capability unit IIIe–1; woodland group 4; wildlife group 3)

Lloyd clay loam, 6 to 10 percent slopes, severely eroded (LeC3).—This soil has a reddish-brown to weak-red clay loam plow layer, 4 to 6 inches thick, that consists largely of original subsoil material. Beneath this is a layer of red to dark-red clay to clay loam 18 to 50 inches thick. Shallow gullies are common, and there are a few gullies 3 to 5 feet deep. In a few very severely eroded areas that were included in mapping, the surface layer is clay.

This soil is hard to work when dry, and it sticks to the plow when wet. Its use for crops is limited. Permeability is moderate, and the available moisture capacity is medium. Surface runoff is rapid. The erosion hazard is severe. The root zone is fairly thick.

This soil is extensive. Practically all of the acreage has been cultivated, but now 68 percent is wooded and the rest is cultivated and pastured. (Capability unit IVe–1; woodland group 4; wildlife group 3)

Lloyd clay loam, 10 to 15 percent slopes, severely eroded (LeD3).—This soil generally occurs on valley slopes between the gentle slopes of the interstream ridges and the stream bottoms. The surface layer is reddish-brown to weak-red clay loam. In some very severely eroded areas that were included in mapping, the surface layer is clay. Below the surface layer is a layer of firm, red to dark-red clay, 18 to 45 inches thick. Shallow gullies are common, and a few deep gullies penetrate the partly weathered rock material. At the foot of some slopes the surface layer is thicker because of the accumulation of material washed from higher lying soils.

Surface runoff is rapid, and the erosion hazard is severe. Permeability is moderate, and the available moisture capacity is low. Suitability for cultivated crops is limited.

This soil is extensive. All of it has been cultivated, but now 10 percent is pastured and the rest is forested. (Capability unit IVe–1; woodland group 4; wildlife group 4)

Lloyd clay loam, 15 to 25 percent slopes, severely eroded (LeE3).—This soil generally occurs on the sides of valleys, between the gently sloping interstream divides and the flood plains. The surface layer is reddish-brown to weak-red clay loam. In some very severely eroded areas that were included in mapping, the surface layer is clay. Below the surface layer is a layer of firm, red to dark-red clay, 15 to 36 inches thick.

This soil is not suited to crops. Shallow gullies are common, and there are a few gullies 5 to 7 feet deep. Surface runoff is rapid, and the erosion hazard is severe. Permeability is moderate, and the available moisture capacity is low. The total acreage of this soil is small. Most of it has been cultivated, but now it has mostly reverted to pine forest. (Capability unit VIe–2; woodland group 4; wildlife group 4)

Lloyd-Gullied land complex, 6 to 10 percent slopes (LeC4).—Erosion has removed all of the original surface layer and most of the original subsoil from this complex. The present surface layer ordinarily is red to weak-red clay loam, but in some areas it is clay. Below it is 10 to 48 inches of red to dark-red clay. There are intricate patterns of shallow and deep gullies in most areas, and a few gullies have cut into the partly weathered rock material. The surface layer between the gullies is mainly original subsoil material.

This complex has poor tilth, a fairly thick root zone, low available moisture capacity, and moderate permeability. It is not suited to cultivated crops. Reclamation and renovation are usually necessary before it can be pastured. The erosion hazard is very severe, and unless these areas are stabilized they produce a large amount of sediment.

This complex is moderately extensive. Most of the acreage has been cultivated, but now it is all in forest. (Capability unit VIe–2; woodland group 4; wildlife group 4)

Lloyd-Gullied land complex, 10 to 15 percent slopes (LeD4).—This complex consists of areas from which erosion has removed all of the original surface soil and most of the original subsoil. The present surface layer is reddish-brown to weak-red clay loam and is mostly subsoil material. Beneath it is a layer of red to dark-red clay to clay loam, 12 to 30 inches thick. There are intricate patterns of shallow and deep gullies in most of the areas, and a few gullies have cut deep into the partly weathered rock material.

This complex has poor tilth, low available moisture capacity, moderate permeability, and a fairly thin root zone. It is poorly suited to cultivated crops. Reclamation and renovation are usually necessary before it can be pastured. Surface runoff is very rapid, and the erosion hazard is very severe. Unstabilized areas produce a large amount of sediment.

The total acreage of this complex is small. Although most of it has been cultivated, it is now all forested. (Capability unit VIe–2; woodland group 4; wildlife group 4)

Local Alluvial Land (Lcm)

This land type consists of deep, well-drained, recent alluvium that has washed from nearby uplands and accumulated in depressions and at the head of drains. The

slope is 0 to 2 percent. The plow layer ranges from light yellowish-brown sandy loam to dark reddish-brown loam. Beneath it are layers that vary in texture and color. The alluvial deposits are 25 to 40 inches thick and overlie soils of the uplands.

This land type is low or medium in natural fertility and organic-matter content. It is easy to work, has a thick root zone, and is suited to a wide range of crops. The available moisture capacity is high, and permeability is generally moderate.

This land type is moderately extensive and occurs as small areas in all parts of the county. It responds to good management, especially fertilization. About half of the acreage is cultivated or pastured. Capability unit I–1; woodland group 1; wildlife group 7).

Louisburg Series

The Louisburg series consists of shallow to moderately deep, somewhat excessively drained soils on the uplands. These soils formed in material weathered from granite and gneiss. They commonly have a gray to dark grayish-brown sandy loam to stony loamy sand surface layer, 5 to 18 inches thick, over light yellowish-brown to red, partly weathered rock material of coarse sandy texture. They are low in natural fertility and organic-matter content and are strongly acid. The depth to bedrock is 1 to 6 feet. The slope range is 2 to 25 percent, but slopes ordinarily are between 10 and 15 percent.

Louisburg soils occur with Wilkes, Appling, and Cecil soils. They contain more coarse-textured material and more acidic rock material than do Wilkes soils, which are shallow soils derived from mixed basic and acidic rocks. As compared with Appling and Cecil soils, which are deep, well-drained soils derived from acidic rocks, Louisburg soils lack the distinct horizons characteristic of those soils, are shallower, and contain more coarse-textured material.

Louisburg soils are moderately extensive and occur throughout the county. The largest acreage is west of Godfrey. The original vegetation consisted predominantly of post oak, white oak, red oak, blackjack oak, hickory, and some shortleaf pine. Most of the acreage has been cultivated, but now practically all is forested.

Louisburg complex, 10 to 15 percent slopes (LlD).—This is a somewhat excessively drained soil on the uplands. The major horizons in the profile are—

0 to 9 inches, dark grayish-brown to brown, loose loamy coarse sand.
9 to 15 inches, red, friable coarse sandy clay loam; weak, granular structure.
15 to 40 inches, weathered, coarse-textured, acidic rock that breaks down to loamy coarse sand.

The surface layer is generally loamy coarse sand but ranges to coarse sandy loam and sandy loam. The 9- to 15-inch layer ranges from coarse loamy sand to sandy clay loam in texture and in some places is variegated in color. In some areas this layer is lacking, and in these places the surface layer rests on bedrock and there are a few outcrops. Generally the plow layer is within the surface layer, but the root zone extends into the partly weathered rock material, which is micaceous in some areas. A few gullies have cut to bedrock.

Permeability is moderate to rapid, and the available moisture capacity is low. Surface runoff is medium or rapid.

This soil is suited to a narrow range of crops and responds temporarily to good management. It is usually easy to work. It is not suited to cultivated crops because it is somewhat excessively drained. Most of the acreage has been cultivated but now practically all is in forest consisting of loblolly pine and shortleaf pine. (Capability unit VIe–3; woodland group 5; wildlife group 6)

Louisburg complex, 6 to 10 percent slopes (LlC).—This soil is shallow to moderately deep and has a gray to dark grayish-brown surface layer that ranges from sandy loam to loamy coarse sand in texture. Beneath this is light yellowish-brown to red, partly weathered rock material of coarse sandy texture. The surface layer rests on bedrock in places, and there are scattered rock outcrops. The root zone extends into the partly weathered rock material.

Permeability is moderate to rapid. Surface runoff is medium. The low available moisture capacity limits the kinds of plants that can be grown and the suitability of this soil for cultivation.

This soil is easy to work. It responds temporarily to good management, but fertilizer is quickly used up or leached. The total acreage is small. Most of it has been cultivated, but practically all is now in forest. (Capability unit IVe–4; woodland group 5; wildlife group 6)

Louisburg stony complex, 15 to 25 percent slopes (LmE).—The surface layer of this shallow soil is gray stony loamy sand and is 3 to 15 inches thick. Beneath the surface layer is light yellowish-brown, coarse-textured, partly weathered rock material. Roots extend into this material. Bedrock ordinarily is at a depth of 10 to 24 inches, but in a few small areas bedrock, generally granite or granite gneiss, crops out at the surface. Stones and large boulders are common on the surface. In places the surface layer is loamy coarse sand, free of stones.

The tilth is poor. Surface runoff is rapid. Low available moisture capacity is a limitation, and stones and boulders prevent the use of farm machinery. The total acreage of this soil is small, and all of it is in forest. (Capability unit VIIe–2; woodland group 5; wildlife group 6)

Vance Series

The Vance series consists of deep, moderately well drained soils that have a yellowish-brown to brownish-yellow sandy loam surface layer and a very firm, strong-brown to yellowish-red clayey subsoil mottled with red. These soils are on the uplands. They developed in material weathered from mixed rocks, predominantly granite and gneiss that had been cut by intrusions of basic rock. The depth to bedrock commonly is about 7 feet but ranges from 5 to 12 feet. The slope range is 2 to 10 percent. These soils are low in natural fertility and organic-matter content and are strongly acid.

Vance soils occur as small areas throughout the county, with Appling and Cecil soils. They resemble Appling soils in color but have a tougher, firmer, and more plastic subsoil. Vance soils are less well drained and less red than Cecil soils, and their subsoil is tougher and more plastic than that of Cecil soils.

The total acreage of Vance soils is small. The original vegetation consisted of white oak, post oak, red oak, blackjack oak, and a little hickory and shortleaf pine. Most of the acreage has been cultivated, but now about half is forested.

Vance sandy loam, 2 to 6 percent slopes, eroded (VaB2).—This is a moderately well drained soil on the uplands. The major horizons in the profile are—

0 to 6 inches, yellowish-brown, very friable sandy loam.
6 to 33 inches, strong-brown to brownish-yellow, very firm clay mottled with red and gray in the lower part; strongly developed angular blocky structure.
33 to 42 inches +, predominantly gray, firm clay weathered from acidic and basic rocks.

The surface layer ranges from yellowish brown to brownish yellow in color. The subsoil is strong brown to yellowish red. Its texture is generally clay, but in a few small areas it is sandy clay. In places the upper 1 to 7 inches of subsoil is sandy clay loam. Some severely eroded areas were included in mapping, and in these the surface layer is sandy clay loam. The color of the plow layer depends on the amount of subsoil material that has been mixed with the surface layer by tillage. There are a few shallow gullies and also a few deep ones.

The plow layer is generally easy to work, except in the severely eroded areas. The root zone is moderately thick. Surface runoff is medium, permeability is slow, and the available moisture capacity is moderately low. Erosion is a moderate hazard.

This soil is suited to a medium range of crops. The acreage is small, and about 75 percent of it is cultivated or pastured. (Capability unit IIe–3; woodland group 6; wildlife group 5)

Vance sandy loam, 6 to 10 percent slopes, eroded (VaC2).—This soil has a yellowish-brown to brownish-yellow sandy loam surface layer and a very firm, strong-brown to yellowish-red clayey subsoil mottled with red. The plow layer generally extends into the subsoil. Its color depends on the amount of clayey material that has been mixed with the surface layer. A few severely eroded areas were included in mapping, and in these the surface layer is brown sandy clay loam. There are a few shallow gullies and also a few deep ones.

The root zone is moderately thick. The tilth is good, except in severely eroded areas. The available moisture capacity is moderately low, and permeability is slow. Surface runoff is moderately rapid. Erosion is a severe hazard.

If well managed, this soil is suited to a medium range of crops. The acreage is small, and about half of it is cultivated or pastured. (Capability unit IIIe–3; woodland group 6; wildlife group 5)

Wehadkee Series

The Wehadkee series consists of poorly drained soils on nearly level bottom lands along several of the larger streams in the county. These soils were derived from recent alluvium washed from uplands. They generally have a mottled reddish-brown silty clay loam surface layer and a mottled brown or gray, gleyed silty clay loam and sandy clay subsurface layer. These soils are medium acid to strongly acid and are low in natural fertility and in organic-matter content. The water table is commonly near the surface.

Wehadkee soils are not extensive. They occur with Congaree and Chewacla soils. They are more poorly drained than either Congaree soils, which are mottle free to a depth of 30 inches or more, or Chewacla soils, which are mottle free to a depth of 12 to 30 inches. The original vegetation consisted of water-tolerant hardwoods. Some areas have been drained and pastured, but now practically all of the acreage is covered by willow, maple, ash, and gum trees.

Wehadkee silty clay loam (0 to 2 percent slopes) (Weh).—This is a poorly drained soil on flood plains. The major horizons in the profile are—

0 to 6 inches, reddish-brown, faintly mottled, friable silty clay loam.
6 to 36 inches +, mottled, light-gray, plastic silty clay loam or sandy clay.

The color of the surface layer ranges from grayish brown to very dark reddish brown. The thickness of the alluvial deposit ranges from 36 inches to several feet. In places there are recent deposits of brown coarse sand, 3 to 6 inches thick, on the surface.

This soil is ponded or has slow surface runoff, slow or very slow permeability, and medium available moisture capacity. It is suited only to water-tolerant plants. If drained and protected from floods, however, it is suited to many pasture plants. The total acreage is small, and practically all of it is in hardwoods. (Capability unit IVw–1; woodland group 9; wildlife group 9)

Wickham Series

The Wickham series consists of deep, well-drained soils on terraces, or benches, 6 to 25 feet above the flood plains of several of the larger streams. These soils formed in old alluvium washed from uplands. They commonly have a brown fine sandy loam surface layer and yellowish-red fine sandy clay loam subsoil that is mottled in the lower part. The texture of the subsoil is generally clay loam and fine sandy clay loam. The slope range is 0 to 10 percent, but slopes are ordinarily less than 6 percent. These soils are low in natural fertility and organic-matter content and are medium acid or strongly acid.

Wickham soils are commonly near Altavista soils. They are redder and better drained than those soils.

Wickham soils are suited to a wide range of crops and respond well to fertilization. The original vegetation consisted of hardwoods and pines. Most of the acreage has been cultivated, but now one-third has reverted to loblolly pine and shortleaf pine and two-thirds is cultivated or pastured.

Wickham fine sandy loam, 2 to 6 percent slopes, eroded (WgB2).—This is a deep, well-drained soil on terraces along the larger streams. The major horizons in the profile are—

0 to 10 inches, brown to dark-brown, very friable fine sandy loam.
10 to 52 inches, yellowish-red, friable to firm sandy clay loam mottled in the lower part; weakly to moderately developed subangular blocky structure; a few small manganese concretions and quartz fragments and few to many mica flakes.
52 to 60 inches +, predominantly red and strong-brown, very friable sandy loam material.

The surface layer is generally fine sandy loam but is sandy loam along some of the creeks. It ranges from yellowish brown to reddish brown. The subsoil ranges from fine sandy clay loam to clay loam; the upper part is sandy clay in a few areas. The color of the subsoil ranges from yellowish red to red and in a few areas is dark red and strong brown. Generally, mottles are more than 30 inches below the surface.

Surface runoff is usually slow, and erosion is not a problem. Permeability is moderate, and the available moisture capacity is medium. Overflow is rare.

This soil is easily worked, has a thick root zone, and is suited to a wide range of crops. It responds well to good management, especially fertilization. The acreage is small, and about 70 percent is cultivated or pastured. (Capability unit IIe-1; woodland group 3; wildlife group 1)

Wickham clay loam, 6 to 10 percent slopes, severely eroded (WhC3).—This soil has a yellowish-red clay loam surface layer, 4 to 6 inches thick, that is mostly original subsoil material. In a few areas this layer is fine sandy clay loam. The subsoil is yellowish-red to red clay loam and is 24 to 52 inches thick. Mottles are generally below a depth of 30 inches. This soil occurs mostly as long narrow slopes between fields of nearly level to very gently sloping Wickham soils and the flood plain. In a few areas the slopes are between 10 and 15 percent. Shallow gullies are common, and a few gullies are 2 to 5 feet deep.

Permeability is moderate, and the available moisture capacity is medium. Surface runoff is rapid, and the erosion hazard is severe. The root zone is fairly thick. This soil is suited to a limited range of crops. It is fairly hard to work when dry. The acreage is small. Most of it has been cultivated, but now most of it is wooded. (Capability unit IVe–1; woodland group 4; wildlife group 3)

Wilkes Series

The Wilkes series consists of well-drained to excessively drained soils on the uplands. These soils formed in a mixture of material weathered from basic and acidic rocks, chiefly granite and hornblende gneiss, but also some schist. They commonly have a very dark grayish-brown to strong-brown sandy loam surface layer. The depth to partly weathered rock is 2 to 15 inches. The slope range is 6 to 25 percent, but slopes are mostly between 10 and 15 percent. These soils are low in natural fertility, low in organic-matter content, and slightly acid to strongly acid.

Wilkes soils occur with Louisburg soils and Helena soils. They contain more fine-textured material and basic rock material than do Louisburg soils, which are shallow to moderately deep and were derived from acidic rock. They lack the distinct B horizon of the Helena soils, which have a very firm clayey subsoil.

Wilkes soils are moderately extensive and occur as small areas throughout the county. The original vegetation consisted of blackjack oak, red oak, and some shortleaf pine. A large part of the acreage has been cultivated, but now most of it is in forest of shortleaf pine and loblolly pine. Hawthorn, wild plum, and briers are growing on some idle areas.

Wilkes complex, 10 to 15 percent slopes, eroded (WpD2).—This complex is made up of shallow, well-drained to excessively drained soils on the uplands. The major horizons in the profile are—

0 to 3 inches, very dark grayish-brown, very friable sandy loam.
3 to 7 inches, dark grayish-brown to yellowish-brown sandy loam mixed with partially weathered basic rock material.
7 to 38 inches, weathered basic and acidic rock material that breaks down to sandy loam.

The texture of the surface layer is generally sandy loam, but in some areas it is fine sandy loam. The color ranges from very dark grayish brown to strong brown. A clayey horizon, 3 to 8 inches thick, has developed below the surface layer in some places. In most areas that have been cultivated, some partly weathered rock material has been mixed with the surface layer. A few severely eroded areas were included in mapping, and in these the surface layer is mostly partly weathered rock material that varies widely in color and composition. There are a few shallow gullies. Some areas have stones on the surface.

These soils have a thin root zone. Generally, the tilth is fair to poor. Permeability is generally moderate to slow but varies widely from place to place. The available moisture capacity is generally low. Surface runoff is rapid, and the erosion hazard is severe. The soils of this complex respond temporarily to good management, but they are not suited to cultivated crops. The soils are moderately extensive. Almost all of their acreage has been cultivated, but about 90 percent is now in forest. (Capability unit VIe–3; woodland group 8; wildlife group 6)

Wilkes complex, 2 to 6 percent slopes, eroded (WpB2).—The soils in this complex have a yellowish-brown sandy clay loam to sandy loam plow layer, 5 to 9 inches thick. Sandy clay loam is the dominant texture. Beneath the surface layer is light yellowish-brown sandy loam with few, prominent, coarse, red mottles that are largely partly weathered basic and acidic rock material. It is hard when dry and friable when moist. Some very severely eroded areas were included in mapping, and in these the plow layer consists entirely of partly weathered rock material. Shallow gullies and galled spots are common. A few gullies are 2 to 3 feet deep.

Permeability varies widely, and the available moisture capacity is low. Surface runoff is medium or rapid. Erosion is a severe hazard. The root zone is moderately thick.

Under excellent management these soils can be used for a few kinds of cultivated crops. They can be worked only within a narrow range of moisture content. The acreage is small. Most of it is in forest. Some is idle. (Capability unit IIIe–5; woodland group 8; wildlife group 6)

Wilkes complex, 6 to 10 percent slopes, eroded (WpC2).—The soils in this complex have a dark grayish-brown to strong-brown sandy loam to sandy clay loam surface layer, 3 to 9 inches thick, over partly weathered basic and acidic rock. A clayey layer, 4 to 8 inches thick, has developed below the surface layer in places. In most areas some partly weathered rock material has been mixed with the surface layer by tillage. A few severely eroded areas were included in mapping, and here the surface layer is mostly partly weathered rock material that varies

widely in color and composition. There are a few shallow gullies. Some areas have stones on the surface.

These soils have a thin root zone and are usually fairly difficult to work. Permeability varies widely from place to place but generally is moderate to slow. The available moisture capacity is generally low. The erosion hazard is moderate or severe because these shallow soils have medium or rapid surface runoff.

These soils are suited to only a narrow range of crops and respond only temporarily to good management. The total acreage is small. Most of it has been cultivated, but now about 8 percent is pastured and the rest is wooded. (Capability unit IVe–4; woodland group 8; wildlife group 6)

Wilkes complex, 15 to 25 percent slopes (WpE).—The soils in this complex commonly have a dark grayish-brown to strong-brown sandy loam surface layer, 2 to 9 inches thick, which ranges in texture from fine sandy loam to loamy sand. Beneath this layer is mostly decomposed basic and acidic rock. A few small eroded areas were included in mapping, and in these areas partly weathered rock is at the surface. A few shallow gullies occur in places, and a few areas have stones on the surface.

These soils have fair tilth, but their root zone is generally thin. Permeability varies widely but is predominantly moderate to slow. The available moisture capacity is generally low. The erosion hazard is very severe because these shallow soils have rapid surface runoff.

These soils are not suited to cultivated crops. They are suited to only a narrow range of plants and respond only temporarily to good management. The total acreage is small. Practically all of it is in forest. (Capability unit VIIe-2; woodland group 8; wildlife group 6)

Worsham Series

The Worsham series consists of poorly drained soils in depressions and at the head of streams. These soils developed in material weathered from light-colored granite and gneiss mixed with a lesser amount of local alluvium. They generally have a dark-brown sandy loam surface layer and mottled, gleyed, gray sandy clay subsoil. The depth to bedrock is 3 to 8 feet. The slope range is 2 to 6 percent. These soils are low in natural fertility, low in organic-matter content, and strongly acid.

Worsham soils occur in scattered small areas with Colfax and Appling soils. They are more poorly drained and have grayer and more plastic subsoil than Colfax soils, which are somewhat poorly drained and have mottled olive to yellowish-brown clay loam subsoil. They are much more poorly drained than Appling soils, which are well drained and have yellowish-brown to yellowish-red subsoil mottled in the lower part.

The vegetation consisted of sweetgum, oak, and maple. Most of the acreage was cultivated, but now it is about equally divided between pasture and woods.

Worsham sandy loam, 2 to 6 percent slopes (WkB).—This is a poorly drained soil in depressions and at the head of drains. The major horizons in the profile are—

0 to 12 inches, dark-brown, friable sandy loam with a few yellowish-red mottles.

12 to 40 inches, gray to light-gray, firm and plastic sandy clay mottled with brownish yellow; weak to moderate, blocky structure.

40 to 50 inches +, bluish-gray clay loam to clay material derived from acidic rocks.

The surface layer is dark-brown to dark-gray sandy loam, and the subsoil is mottled gray to grayish brown. The recent deposits of alluvium range from 3 to 12 inches in thickness.

This soil is seldom dry enough to work because there is slow lateral movement of water. Runoff is slow, and water ponds in places. Permeability is slow. The root zone is shallow.

This soil is not suited to cultivated crops but will grow water-tolerant pasture plants. It is moderately extensive and is divided about equally between pasture and woods. (Capability unit Vw–1; woodland group 9; wildlife group 9)

Use of Soils for Cultivated Crops and Pasture

In this section the system of capability grouping used by the Soil Conservation Service is explained, the soils in each capability unit are described, and the suitability of the soils for cultivated crops and pasture is discussed. Basic management practices are suggested for soils used for cultivated crops. Estimated yields of specified crops are given for all of the soils of the county, under two levels of management, and the management required for such yields is described. The effect of climate on crop yields is discussed, and the probabilities of drought, of freezing, and of receiving specified amounts of rainfall are given.

Capability Groups of Soils

The capability classification is a grouping of soils that shows, in a general way, how suitable the soils are for most kinds of farming. It is a practical grouping based on limitations of the soils, the risk of damage when they are used, and the way they respond to treatment.

In this system all the kinds of soil are grouped at three levels—the capability class, the subclass, and the unit. The eight capability classes in the broadest grouping are designated by Roman numerals I through VIII. In class I are the soils that have few limitations, the widest range of use, and the least risk of damage when they are used. The soils in the other classes have progressively greater natural limitations. In class VIII are soils and landforms so rough, shallow, or otherwise limited that they do not produce worthwhile yields of crops, forage, or wood products.

The subclasses indicate major kinds of limitations within the classes. Within most of the classes, there can be as many as four subclasses. The subclass is indicated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* means that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the country, indicates that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few or no limitations. Class V can contain, at the most, only subclasses *w*, *s*, and *c*, because there is little or no erosion hazard but the soils have limitations that restrict their use largely to pasture, range, woodland, or wildlife.

Within the subclasses are the capability units, which are groups of soils enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally identified by numbers assigned locally, for example, IIe–1 or IIIe–2. The capability units are not numbered consecutively in this report, because not all the capability units used in the Piedmont section of Georgia are represented in Morgan County.

Soils are classified in capability classes, subclasses, and units in accordance with the degree and kind of their permanent limitations, but without consideration of major and generally expensive landforming that would change the slope, depth, or other characteristics of the soil, and without consideration of possible but unlikely major reclamation projects.

The eight classes in the capability system, and the subclasses and units in this county, are described in the list that follows.

Class I. Soils that have few limitations that restrict their use.

- Unit I–1.—Deep, well-drained loamy material washed from adjacent uplands and accumulated in depressions and at the head of draws. The slope range is 0 to 2 percent.
- Unit I–2.—Moderately well drained, friable soils on stream terraces. The slope range is 0 to 2 percent.

Class II. Soils that have some limitations that reduce the choice of plants or that require moderate conservation practices.

Subclass IIe. Soils subject to moderate erosion if they are not protected.

- Unit IIe–1.—Deep, well-drained, slightly eroded or moderately eroded soils; loamy surface layer and red to dark-red clayey subsoil. The slope range is 2 to 6 percent.
- Unit IIe–2.—Deep, well-drained, slightly eroded or moderately eroded soils; loamy to sandy surface layer and yellowish-brown to mottled brown and red sandy clay loam to clay subsoil. The slope range is 2 to 6 percent.
- Unit IIe–3.—Moderately eroded loamy soils; very firm, mottled clayey subsoil. The slope range is 2 to 6 percent.
- Unit IIe–4.—Moderately well drained or somewhat poorly drained soils; loamy surface layer and plastic clay subsoil. The slope range is 2 to 6 percent.

Subclass IIw. Soils that have moderate limitations because of excess water.

- Unit IIw–2.—Moderately well drained or well drained soils on flood plains; subject to occasional overflow. The slope range is 0 to 2 percent.

Class III. Soils that have severe limitations that reduce the choice of plants, require special conservation practices, or both.

Subclass IIIe. Soils subject to severe erosion if they are cultivated and not protected.

- Unit IIIe–1.—Deep, well-drained, moderately eroded or severely eroded soils on the uplands; loamy surface layer and firm to friable, red to dark-red clayey subsoil. The slope range is 2 to 10 percent.
- Unit IIIe–2.—Deep, well-drained, moderately eroded or severely eroded soils; loamy coarse sand and sandy clay loam surface layer and sandy clay loam to clay subsoil. The slope range is 2 to 10 percent.
- Unit IIIe–3.—Deep, moderately well drained, moderately eroded soils; loamy surface layer and very firm, mottled, clayey subsoil. The slope range is 6 to 10 percent.
- Unit IIIe–5.—Shallow or moderately deep, moderately eroded soils. The slope range is 2 to 6 percent.

Subclass IIIw. Soils that have severe limitations because of excess water.

- Unit IIIw–2.—Soils on flood plains; subject to overflow. The slope range is 0 to 2 percent.
- Unit IIIw–3.—Somewhat poorly drained upland soils in depressions, around the head of drains, and on toe slopes; mottled, friable to firm subsoil. The slope range is 2 to 6 percent.

Class IV. Soils that have very severe limitations that restrict the choice of plants, require very careful management, or both.

Subclass IVe. Soils subject to very severe erosion if they are cultivated and not protected.

- Unit IVe–1. –Deep, well-drained, moderately eroded or severely eroded soils; loamy surface layer and friable clay to sandy clay loam subsoil. The slope range is 2 to 15 percent.
- Unit IVe–2.—Somewhat poorly drained or moderately well drained, moderately eroded or severely eroded soils on the uplands; firm or plastic subsoil. The slope range is 2 to 10 percent.
- Unit IVe–4.—Shallow or moderately deep, well-drained to excessively drained, slightly eroded or moderately eroded soils. The slope range is 6 to 10 percent.

Subclass IVw. Soils that have very severe limitations for cultivation because of excess water.

- Unit IVw–1.—Wet and poorly drained soils on flood plains; subject to frequent overflow. The slope range is 0 to 2 percent.

Class V. Soils that are not likely to erode but have other limitations, impractical to remove without major reclamation, that limit their use largely to pasture or range, woodland, or wildlife food and cover.

Subclass Vw. Soils too wet for cultivation; drainage or protection not feasible.

- Unit Vw–1.—Poorly drained upland soils in depressions and around the head of drains; sandy loam surface layer and mottled gray sandy clay subsoil. The slope range is 2 to 6 percent.

Class VI. Soils that have severe limitations that make them generally unsuitable for cultivation and that limit their use largely to pasture or range, woodland, or wildlife food and cover.

Subclass VIe. Soils severely limited, chiefly by risk of erosion if protective cover is not maintained.

Unit VIe–2.—Deep, well-drained, severely eroded soils on the uplands, and gullied land complexes in valleys and on side slopes. The slope range is 6 to 25 percent.

Unit VIe–3.—Slightly eroded or moderately eroded, shallow or moderately deep, well-drained to excessively drained soils on hillsides and valley slopes. The slope range is 10 to 15 percent.

Unit VIe–4.—Severely eroded soils; plastic clayey subsoil. The slope range is 6 to 10 percent.

Class VII. Soils that have very severe limitations that make them unsuitable for cultivation without major reclamation, and that restrict their use largely to grazing, woodland, or wildlife.

Subclass VIIe. Soils very severely limited, chiefly by risk of erosion if protective cover is not maintained.

Unit VIIe–1.—Severely eroded upland soils and gullied land complexes. Slope range is 10 to 25 percent.

Unit VIIe–2.—Steep, eroded soils; shallow and stony. The slope range is 15 to 25 percent.

Unit VIIe–4.—Gullied land.

Class VIII. Soils and landforms that have limitations that preclude their use, without major reclamation, for commercial production of plants, and restrict their use to recreation, wildlife, water supply, or esthetic purposes. (There are no class VIII soils in Morgan County.)

In the following pages each capability unit is described, the soils in each are listed, and some suggestions for use and management are given.

Capability unit I–1

This unit consists of Local alluvial land, a deep, well-drained land type consisting of loamy material that was washed from the adjacent uplands and has accumulated in depressions and at the head of draws. The slope range is 0 to 2 percent.

This land type has a thick root zone, has high available moisture capacity, and is moderately permeable. It is low to medium in natural fertility, contains small to medium amounts of organic matter, and is generally strongly acid. It is easy to work. It is not subject to erosion and has no other significant limitation.

This land type covers about half of 1 percent of the county. About half of the acreage is cultivated or pastured. Many areas are too small to be managed as individual fields and are used in the same way as the surrounding soils. Many areas are well located for use as vegetated waterways.

This land type is suited to most locally grown crops, such as corn and cotton, and is especially well suited to garden and truck crops. If adequately fertilized, it will produce high yields. Crops that produce a large volume of residue, such as corn, can be grown continuously if a winter cover crop is grown every other winter. All locally grown hay and pasture grasses and legumes can be grown. Among those suitable are bermudagrass, tall fescue, dallisgrass, white clover, crimson clover, and lespedeza. Yields of pasture and hay will increase if fertilizer and lime are applied, weeds are controlled by mowing or by use of herbicides, and grazing is controlled so as to maintain a vigorous growth of plants.

Capability unit I–2

The only soil in this unit, Altavista sandy loam, 0 to 2 percent slopes, is a moderately well drained, friable soil on stream terraces. The surface layer to a depth of 5 to 10 inches is very friable sandy loam. Beneath it is friable, moderately permeable sandy clay loam.

This soil has a thick root zone. It has medium available moisture capacity and slow to medium surface runoff. It is low in natural fertility, contains little organic matter, and is strongly acid. It is easy to work and responds well to fertilization. It is not subject to erosion and has no other significant limitation.

This soil covers about one-tenth of 1 percent of the county, and more than one-third of it is in crops and pasture. It is suited to a wide range of crops, such as cotton, corn, grain sorghum, oats, rye, and annual lespedeza. Crops that produce a large amount of residue (fig. 4), such as corn, can be grown continuously if all crop residue is left on or near the surface. Low-residue crops, such as cotton, can be grown continuously if a cover crop is grown every other winter. For high yields, insects and diseases must be controlled and enough fertilizer must be used. This soil also is suited to all locally grown hay and pasture grasses and legumes, such as bermudagrass, dallisgrass, tall fescue, annual lespedeza, and clover. Yields of pas-

Figure 4.—Corn growing on Altavista sandy loam, 0 to 2 percent slopes. Stand produced more than 60 bushels of grain per acre and enough crop residue to maintain supply of organic matter.

ture and hay will increase if fertilizer and lime are applied, weeds are controlled by mowing or by use of herbicides, and grazing is controlled so as to maintain a vigorous growth of plants.

Capability unit IIe–1

This unit consists of deep, well-drained, slightly eroded or moderately eroded soils that have a loamy surface layer and red to dark-red clayey subsoil. The slope range is 2 to 6 percent. These soils are—

Cecil sandy loam, 2 to 6 percent slopes.
Cecil sandy loam, 2 to 6 percent slopes, eroded.
Davidson loam, 2 to 6 percent slopes, eroded.
Lloyd sandy loam, 2 to 6 percent slopes, eroded.
Wickham fine sandy loam, 2 to 6 percent slopes, eroded.

These soils are on the uplands and stream terraces. The plow layer, to a depth of 5 to 8 inches, is very friable sandy loam to friable loam. The subsoil is friable, moderately permeable sandy clay loam to firm clay. These soils have a thick root zone. Their available moisture capacity is medium. They are low to medium in natural fertility, contain little organic matter, and are medium to strongly acid. They are generally easy to work, and they respond well to fertilization.

These soils cover about 19 percent of the county. About 45 percent of their acreage is cultivated, and 30 percent is pastured. They are suited to locally grown crops, such as cotton, corn, oats, wheat, rye, vetch, crimson clover, grain sorghum, starr millet, browntop millet, and peaches. Coastal bermudagrass, common bermudagrass, tall fescue, dallisgrass, annual lespedeza, sericea lespedeza, crimson clover, white clover, and alfalfa are suitable pasture and hay plants. High yields can be expected if enough fertilizer is used.

Erosion is a slight or moderate hazard in cultivated areas. To retard runoff and control erosion, a combination of some of the following measures may be used: terraces, contour tillage (fig. 5), stripcropping, mulch planting, vegetated waterways, and crop rotations that include grasses and legumes. Adequate fertilization is needed for both cultivated and close-growing crops. The erosion hazard makes it inadvisable to grow clean-cultivated crops continuously.

***Figure 5.*—Terraces and contour tillage on Cecil sandy loam, 2 to 6 percent slopes, eroded.**

One example of a suitable cropping system is—

First year: Cotton, followed by oats drilled in stubble that has been mowed or disked.
Second year: Oats, for grain or hay, overseeded with lespedeza.
Third year: Corn, cultivated shallow and laid by early. After harvest, mow the stubble and leave unplowed all winter.

A second example is—

First year: Cotton, followed by crimson clover or vetch drilled in stubble.
Second year: Legume turned under. Corn, planted 6 weeks later, cultivated shallow, and laid by early. Oats, drilled in corn stubble after mowing or disking.
Third year: Oats, harvested for grain or hay, or grazed and overseeded with annual lespedeza.
Fourth year: Volunteer lespedeza, for hay or grazing.

A third example of a suitable cropping system is—

Two years or more of Coastal bermudagrass, followed by corn, harvested for grain or silage. Mow stubble, and allow bermudagrass to reestablish sod.

Residues of annual grasses or legumes help to improve and maintain tilth and soil structure if left on the surface between seasons of crop production and at or near the surface whenever possible while a crop is growing. Yields of pasture and hay plants are better if fertilizer and lime are applied, weeds are controlled by mowing or by use of herbicides, and grazing is controlled so as to maintain a vigorous growth.

Capability unit IIe–2

This unit consists of deep, well-drained, slightly eroded or moderately eroded soils that have a loamy to sandy surface layer and yellowish-brown to mottled brown and red sandy clay loam to clay subsoil. The slope range is 2 to 6 percent. These soils are—

Altavista sandy loam, 2 to 6 percent slopes.
Appling loamy coarse sand, 2 to 6 percent slopes.
Appling loamy coarse sand, 2 to 6 percent slopes, eroded.

These soils are on the uplands and stream terraces. The surface layer, to a depth of 5 to 10 inches, is loose loamy coarse sand or friable sandy loam. Beneath this is friable, moderately permeable sandy clay loam to firm clay.

These soils have a thick root zone. Their available moisture capacity is low or medium. They are low in natural fertility, contain little organic matter, and are strongly acid. They are easy to work and respond well to fertilization.

These soils cover about 2.5 percent of the county. About 50 percent of their acreage is cultivated, and 30 percent is pastured. They are suited to cotton, corn, grain sorghum, oats, and rye. They generally produce poorer yields of wheat and alfalfa than do soils of capability unit IIe–1. Tall fescue, ryegrass, rescuegrass, Coastal bermudagrass, common bermudagrass, annual lespedeza, sericea lespedeza, crimson clover, and vetch are suitable pasture and hay crops. High yields of the suitable crops can be expected if enough fertilizer is used.

Erosion is a slight to moderate hazard in cultivated areas. To help retard runoff and control erosion, a com-

Figure 6.—**Stripcropping on Appling loamy coarse sand, 2 to 6 percent slopes.**

bination of some of the following measures may be used: terracing, vegetated waterways, contour tillage, stripcropping (fig. 6), mulch planting, and crop rotations that include grasses and legumes. The erosion hazard makes it inadvisable to grow clean-cultivated crops continuously.

One example of a suitable cropping system is—

First year: Cotton, followed by oats or rye drilled in stubble that has been mowed or disked.
Second year: Oats or rye, overseeded with annual lespedeza. Drill in oats or rye.
Third year: Oats or rye, followed by volunteer lespedeza. Leave unplowed all winter.
Fourth year: Corn or grain sorghum, cultivated shallow and laid by early. Leave unplowed all winter.

Another example is—

Two years or more of Coastal bermudagrass sod, followed by corn harvested for grain or silage. Mow stubble, and allow bermudagrass to reestablish sod.

Residues of annual grasses or legumes help to maintain tilth and soil structure if left on the surface all winter and on or near the surface, whenever possible, while a crop is growing. Yields of pasture and hay crops are better if fertilizer and lime are applied, weeds are controlled by mowing or by use of herbicides, and grazing is controlled so as to maintain a vigorous growth.

Capability unit IIe-3

The only soil in this unit, Vance sandy loam, 2 to 6 percent slopes, eroded, is a moderately eroded, loamy soil that has very firm, mottled, clayey subsoil. This soil is on benches, toe slopes, and low divides. The surface layer, to a depth of 4 to 11 inches, is friable sandy loam. Beneath this is very firm, slowly permeable clay to sandy clay.

This soil has a moderately thick root zone. Its available moisture capacity is moderately low. It is low in natural fertility, contains little organic matter, and is strongly acid. It is easy to work, except where it is thin or severely eroded.

This soil occupies about one-tenth of 1 percent of the county. About 30 percent of it is cultivated, and 40 percent is pastured. It is poorly suited to wheat, alfalfa, white clover, and kudzu, but it is well suited to grain sorghum and ryegrass and moderately well suited to cotton, corn, oats, rye, tall fescue, common bermudagrass, dallisgrass, annual lespedeza, sericea lespedeza, and crimson clover. Moderately high yields of the suitable crops can be expected if enough fertilizer is used.

Erosion is a slight or moderate hazard in cultivated areas. A combination of some of the following measures helps to retard runoff and control erosion: terracing, vegetated waterways, contour tillage, stripcropping, and crop rotations that include grasses and legumes. The erosion hazard makes it inadvisable to grow clean-cultivated crops continuously.

An example of a cropping system is—

First year: Corn, cultivated shallow and laid by early. Oats, drilled in corn stubble that has been mowed or disked.
Second year: Oats, for hay or seed. Grain sorghum, planted in oats stubble that has been mowed or disked. After grain sorghum has been harvested, drill oats in stubble that has been mowed.
Third year: Oats, overseeded with lespedeza.
Fourth year: Oats, followed by volunteer lespedeza. After lespedeza has been harvested, leave stubble unplowed all winter.

Residues of annual grasses and legumes help to maintain tilth and structure if left on the surface all winter and on or near the surface, whenever possible, while a crop is growing. Yields of pasture and hay crops are better if fertilizer and lime are applied, weeds are controlled by mowing or by use of herbicides, and grazing is controlled so as to maintain a vigorous growth.

Capability unit IIe-4

This unit consists of moderately well drained or somewhat poorly drained soils that have a loamy surface layer and plastic clay subsoil. The slope range is 2 to 6 percent. These soils are—

Helena sandy loam, 2 to 6 percent slopes, eroded.
Iredell sandy loam, 2 to 6 percent slopes.

The surface layer, to a depth of 3 to 12 inches, is friable sandy loam. Beneath this is firm to very plastic, moderately slowly to very slowly permeable sandy clay loam to clay. This plastic subsoil restricts the penetration of roots.

The tilth is good, except in thin and severely eroded spots. The available moisture capacity is medium. Natural fertility is medium or low, and the organic-matter content is low. Suitable crops respond fairly well to fertilization.

These soils occupy about two-tenths of 1 percent of the county. About three-fourths of their acreage is cultivated or pastured. They are well suited to annual lespedeza and are moderately well suited to cotton, corn, and grain sorghum, and to most other locally grown crops. They are not suited to wheat, peaches, and alfalfa, because of their moderately good or somewhat poor drainage. They require heavy fertilization for good yields. The Iredell soil responds well to extra amounts of potassium.

Erosion is the primary hazard in cultivated areas. Drainage is a secondary problem in many places, espe-

cially in spring when the high water table delays planting. To retard the moderately rapid runoff and to control erosion, some of the following measures may be used: contour tillage, adequately fertilized close-growing crops in the cropping system, stripcropping, terracing, and vegetated waterways. On the Iredell soil ditching may be required to remove the water that stands in depressions after rains.

An example of a suitable cropping system is—
First year: Cotton, followed by rye.
Second year: Grain sorghum, followed by oats.
Third year: Oat straw and stubble, undisturbed or overseeded with annual lespedeza.

Residues of annual cover crops help to maintain tilth if turned in or left on the surface. Yields of pasture and hay are better if fertilizer and lime are applied, weeds are controlled by mowing or by use of herbicides, and grazing is controlled so as to maintain a vigorous growth.

Capability unit IIw-2

One land type, Alluvial land, and one soil, Congaree silt loam, make up this unit. Both are on flood plains, are moderately well drained or well drained, and are subject to occasional overflow. The slope range is 0 to 2 percent. The surface layer, to a depth of 5 to 10 inches, is very friable silt loam or fine sandy loam. Beneath this is moderately permeable sandy loam to silty clay loam that in most areas is free of mottling to a depth of at least 30 inches.

The root zone is thick. The available moisture capacity is medium or high. Natural fertility is medium or low, and the organic-matter content is medium or low. These areas are easy to work, and suitable crops respond well to fertilization.

This unit covers about 4 percent of the county. About 70 percent of the acreage is in hardwood forest, 10 percent is in pasture, and 10 percent is in cultivated crops. Corn, grain sorghum, oats, rye, bermudagrass, ryegrass, dallisgrass, fescue, annual lespedeza, sericea lespedeza, white clover, vetch, and Caley peas are suitable crops. Alfalfa, wheat, cotton, and peaches are not suitable. Row crops can be grown year after year if these areas are protected from floods and a cover crop is grown occasionally. The cover crop and crop residues supply organic matter and help to maintain good tilth. A simple system of ditches to remove excess surface water and a few diversion ditches to intercept seepage water may be necessary on these areas. Generally, sprinkler irrigation is suitable. Nearby streams usually provide enough water for such irrigation if sandbags or simple structures are used to block streamflow, providing a suitable depth for the intake pipe.

Capability unit IIIe-1

This unit consists of deep, well-drained, moderately eroded or severely eroded soils on the uplands. The slope range is 2 to 10 percent. These soils have a loamy surface layer and firm to friable clayey subsoil. They are—

Cecil sandy loam, 6 to 10 percent slopes, eroded.
Cecil sandy clay loam, 2 to 6 percent slopes, severely eroded.
Davidson clay loam, 2 to 6 percent slopes, severely eroded.
Lloyd sandy loam, 6 to 10 percent slopes, eroded.
Lloyd clay loam, 2 to 6 percent slopes, severely eroded.

The plow layer, to a depth of 5 to 8 inches, is friable sandy loam, sandy clay loam, or clay loam. Beneath this is firm to friable, moderately permeable, red to dark-red clay.

Figure 7.—Terraces, vegetated waterways, and contour tillage on Lloyd clay loam, 2 to 6 percent slopes, severely eroded.

These soils have a thick root zone. Their available moisture capacity is medium to low. They are low in natural fertility, contain little organic matter, and are generally strongly acid. Except in severely eroded areas, the tilth is good and crops respond well to fertilization. In severely eroded areas the plow layer is made up chiefly of original subsoil material, tillage is somewhat difficult, and the soils can be cultivated only within a narrow range of moisture content without clodding or puddling. Lloyd and Davidson soils tend to stick to the plow.

These soils cover more than 18 percent of the county. About half of their acreage is woodland. They are suited to all crops commonly grown in the county, such as corn, cotton, grain sorghum, oats, and rye. Crops are more difficult to establish and maintain, the tilth is poorer, and yields generally are lower than on the soils of unit IIe-1. Bermudagrass, dallisgrass, annual lespedeza, sericea lespedeza, crimson clover, white clover, tall fescue, and alfalfa are suitable pasture and hay plants. High yields can be expected if enough fertilizer is used.

Erosion is the chief hazard in cultivated areas. Contour tillage, terraces, vegetated outlets, stripcropping, and adequately fertilized close-growing crops in the cropping system help to retard runoff and control erosion (fig. 7). The erosion hazard makes it inadvisable to grow clean-cultivated crops continuously.

One example of a suitable cropping system is—
First year: Cotton, corn, or grain sorghum. Drill oats or rye in mowed stubble.
Second year: Oats or rye, harvested for seed. Mow or spray to control weeds. Plant alfalfa.
Third through sixth year: Alfalfa for hay.

Another example is—
First year: Corn. Mow stubble, leave unplowed, and leave stubble on surface all winter.
Second year: Cotton or corn, followed by oats or rye and tall fescue.
Third year: Oats or rye, for seed, followed by fescue.
Fourth year: Fescue, for grazing, hay, or seed.

An appropriate perennial in the cropping system helps to improve and maintain tilth and soil structure and is especially needed on the more eroded soils. For best re-

sults, residues should be on the surface between annual row crops and on or near the surface, whenever possible, while a crop is growing. Yields of pasture and hay plants are better if fertilizer and lime are applied, weeds are controlled by mowing or by use of herbicides, and grazing is controlled so as to maintain a vigorous growth.

Capability unit IIIe-2

This unit consists of deep, well-drained, moderately eroded or severely eroded soils that have a loamy coarse sand and sandy clay loam surface layer and sandy clay loam to clay subsoil. The slope range is 2 to 10 percent. These soils are—

Appling sandy clay loam, 2 to 6 percent slopes, severely eroded.
Appling loamy coarse sand, 6 to 10 percent slopes, eroded.

The surface layer is 6 to 8 inches thick and is very friable or friable. Below this, the sandy clay loam is friable and the sandy clay and clay are firm.

These soils have a thick root zone. Their available moisture capacity is medium or low. They are low in natural fertility, contain little organic matter, and are strongly acid. Permeability is moderate or moderately slow. Appling loamy coarse sand is easy to work. Appling sandy clay loam, however, is slightly difficult to till and can be tilled only within a narrow range of moisture content.

These soils occupy about half of 1 percent of the county. Less than 20 percent of their acreage is cultivated. They are suited to cotton, corn, grain sorghum, oats, rye, ryegrass, common bermudagrass, Coastal bermudagrass, annual lespedeza, sericea lespedeza, and crimson clover. They are less well suited to wheat and alfalfa than are the soils of capability unit IIIe-1. Crops are more difficult to establish and maintain and yields are generally lower on these soils than on those of unit IIe-2. Moderately high yields of most of the suitable crops can be expected if enough fertilizer is used.

Erosion is the chief hazard in cultivated areas. Contour tillage, terraces, vegetated outlets, stripcropping, and adequately fertilized close-growing crops in the cropping system help to retard runoff and control erosion. The erosion hazard makes it inadvisable to grow clean-cultivated crops continuously.

One example of a suitable cropping system is—
First year: Corn or grain sorghum, cultivated shallow and laid by early. After harvest, mow the stubble and leave unplowed all winter.
Second year: Cotton, followed by oats and tall fescue.
Third year: Oats, for seed, followed by tall fescue.
Fourth year: Fescue, for grazing or for seed.

Another example is—
At least 2 years of Coastal bermudagrass sod followed by 1 year of corn. Mow stubble and allow sod to become reestablished.

An appropriate perennial in the cropping system helps to improve and maintain tilth and soil structure and is especially needed on the more eroded soils. For best results, all crop residues should be left on the surface between annual row crops and on or near the surface, whenever possible, while a crop is growing. Yields of pasture and hay plants are better if fertilizer and lime are applied, weeds are controlled by mowing or by use of herbicides, and grazing is controlled so as to maintain a vigorous growth.

Capability unit IIIe-3

The only soil in this unit, Vance sandy loam, 6 to 10 percent slopes, eroded, is a deep, moderately well drained, moderately eroded soil that has a loamy surface layer and very firm, mottled, clayey subsoil.

This soil is on the uplands, generally on the lower slopes or on smooth divides. The plow layer, to a depth of 5 to 7 inches, is friable sandy loam. Beneath this is very firm, strong-brown clay mottled with red. This layer is slowly permeable.

This soil has moderately rapid surface runoff, and its available moisture capacity is moderately low. It is low in natural fertility, low in organic-matter content, and strongly acid. It is easy to work, except in severely eroded spots. The root zone is moderately thick, but many roots grow horizontally at the transition line between the surface layer and the very firm subsoil.

This soil occupies about one tenth of 1 percent of the county. About 70 percent of it is wooded. It is poorly suited to alfalfa, wheat, or kudzu because of the firmness of the subsoil, which limits the penetration of roots. It is well suited to grain sorghum and ryegrass but only moderately well suited to most of the other commonly grown crops and pasture plants. Moderate yields of the suitable crops can be expected if enough fertilizer is used.

Because erosion is the chief hazard, this soil needs good water-control measures. Contour tillage, terraces, vegetated outlets, stripcropping, and adequately fertilized close-growing crops in the rotation are effective.

An example of a suitable cropping system is—
First year: Corn or grain sorghum, followed by oats drilled through mowed stubble.
Second year: Overseed with annual lespedeza; harvest for hay.
Third year: Annual lespedeza for hay or seed.

An appropriate perennial in the cropping system helps to improve and maintain tilth and soil structure. For best results, all residues should be left on the surface between annual crops and on or near the surface, whenever possible, while a crop is growing. Yields of pasture and hay are better if fertilizer and lime are applied, weeds are controlled by moving or by use of herbicides, and grazing is controlled so as to maintain a vigorous growth.

Capability unit IIIe-5

This unit consists of Wilkes complex, 2 to 6 percent slopes, eroded. The soils in this complex are shallow or moderately deep and are moderately eroded. The plow layer is predominantly sandy clay loam, but it ranges to sandy loam. It is 5 to 9 inches thick. Beneath it is hard, friable sandy loam that is largely partially weathered basic and acidic rock material.

Tillage ranges from difficult to fairly easy. The available moisture capacity is low, and permeability varies widely. The organic-matter content is low, and the natural fertility is low.

These soils occupy about half of 1 percent of the county. Their acreage is mostly in forest. They are well suited to bermudagrass, annual lespedeza, and sericea lespedeza and are moderately well suited to cotton and corn. Generally, they are poorly suited to wheat, alfalfa, white clover, kudzu, and dallisgrass. Row crops will produce

moderate to low yields if grown occasionally in a cropping system with close-growing crops.

An example of such a cropping system is—

First year: Grain sorghum or corn, followed by tall fescue.

Second and third years: Fescue, for grazing.

The severe erosion hazard makes it necessary to retard runoff by means of some of the following measures: stripcropping, terracing, vegetated outlets, and adequately fertilized close-growing crops in the rotation. Yields of pasture and hay plants can be improved by fertilizing and liming the soils, controlling weeds by mowing or by use of herbicides, and controlling grazing so as to maintain a vigorous growth.

Capability unit IIIw-2

One land type, Alluvial land, moderately wet, and one soil, Chewacla silt loam, make up this unit. Both are on flood plains of streams that overflow irregularly for short periods. The slope range is 0 to 2 percent. The water table is near the surface during wet periods and at a depth of 18 to 40 inches during dry spells. The surface layer is fine sandy loam to silty clay loam. Beneath it are stratified layers predominantly of silty clay loam, sand, clay, and silt.

Except in wet spots and during wet periods, this land type and soil are easy to work. Both are low or medium in natural fertility, low in organic-matter content, and medium or strongly acid. The root zone is thick. Surface runoff is slow, and permeability is moderate to slow.

Soils of this unit cover about 5 percent of the county. Less than 10 percent of the area is pastured or cultivated. If the soils are adequately drained (fig. 8) and a cover crop is grown occasionally, a variety of crops can be grown. Suitable crops include corn, soybeans, millet, oats, grain sorghum, and many truck crops. Some of the best suited pasture and hay plants are dallisgrass, common bermudagrass, tall fescue, ryegrass, annual lespedeza, white clover, and crimson clover. High yields can be expected if enough fertilizer is used and adequate drainage is provided.

Damage from flooding is the chief hazard. A system of ditches is needed to remove excess surface water, to lower the water table during wet seasons, and to improve internal drainage.

Figure 8.—**Drainage operation on Chewacla silt loam.**

One example of a cropping system that helps to maintain the organic-matter content, retard diseases, and return profitable yields is—

First year: Corn or grain sorghum, followed by tall fescue and white clover drilled in stubble that has been mowed, disked, or ripped after harvest.

Second and third years: Tall fescue and white clover, for seed and grazing.

Another example is—

First year: Corn or sorghum, for silage. After harvest, mow the stubble and weeds. Leave unplowed all winter.

Second year: Corn, sorghum, or both, for silage. Oats or rye drilled in stubble after it has been plowed or disked.

Third year: Oats or rye, overseeded with annual lespedeza. Follow annual lespedeza with oats or rye drilled in unplowed stubble.

Fourth year: Oats or rye, harvested. Mow stubble early and harvest volunteer annual lespedeza for hay. Leave unplowed all winter.

Cover crops and crop residues supply organic matter and help to maintain tilth in areas where the soils are used intensively for cultivation. Corn grown continuously for grain provides enough organic matter if the crop is managed well enough to yield 60 bushels of grain and all residues are incorporated into the soil.

Yields of pasture and hay plants are better if fertilizer and lime are applied, weeds are controlled by mowing or by use of herbicides, and grazing is controlled so as to maintain a vigorous growth.

Capability unit IIIw-3

The only soil in this unit, Colfax sandy loam, 2 to 6 percent slopes, is somewhat poorly drained and has friable to firm, mottled subsoil. It is on the uplands in slight depressions, around the head of drains, and on toe slopes. The surface layer, to a depth of about 6 inches, is very friable sandy loam. Below this is mottled, friable sandy clay loam over mottled, firm sandy clay loam and clay loam.

This soil is low in organic-matter content, low in natural fertility, and strongly acid. The tilth is good. The available moisture capacity is medium, and permeability is slow.

This soil occupies about one-tenth of 1 percent of the county and is used in about equal proportions for cultivated crops, pasture, and forest. If adequately drained, it is suited to row crops. Corn, grain sorghum, and a variety of truck crops grow fairly well. Suitable pasture and hay plants are common bermudagrass, dallisgrass, tall fescue, white clover, and annual lespedeza. Wheat, alfalfa, cotton, and peaches are poorly suited. In some years spring planting has to be delayed because of the high water table. A system of ditches will remove the excess surface water and improve internal drainage.

An example of a suitable cropping system is—

First year: Corn or sorghum, followed by tall fescue and white clover drilled in stubble that has been mowed or disked.

Second and third year: Fescue, for seed or grazing.

Annual applications of large amounts of nitrogen, phosphate, and potash are needed because of the low natural fertility. Yields of pasture and hay crops can be improved by fertilizing and liming, controlling weeds by mowing or by use of herbicides, and controlling grazing so as to maintain a vigorous growth.

Capability unit IVe-1

This unit consists of deep, well-drained, moderately eroded or severely eroded soils on side slopes on the uplands. The slope range is 2 to 15 percent. These soils are—

Appling sandy clay loam, 6 to 10 percent slopes, severely eroded.
Cecil sandy loam, 10 to 15 percent slopes, eroded.
Cecil sandy clay loam, 6 to 10 percent slopes, severely eroded.
Cecil-Gullied land complex, 2 to 6 percent slopes.
Davidson clay loam, 6 to 10 percent slopes, severely eroded.
Davidson clay loam, 10 to 15 percent slopes, severely eroded.
Lloyd sandy loam, 10 to 15 percent slopes, eroded.
Lloyd clay loam, 6 to 10 percent slopes, severely eroded.
Lloyd clay loam, 10 to 15 percent slopes, severely eroded.
Wickham clay loam, 6 to 10 percent slopes, severely eroded.

The surface layer of the moderately or strongly sloping soils is sandy loam. That of the nearly level or gently sloping soils is sandy clay loam or clay loam. The subsoil ranges from clay to sandy clay loam.

These soils are low in natural fertility, low in organic-matter content, and predominantly strongly acid. Surface runoff is mostly rapid; permeability is moderate. Tillage is difficult except within a narrow range of moisture content.

These soils cover about 26 percent of the county. About 35 percent of their acreage is in crops and pasture, and the rest is in forest. Suitable plants for pasture or hay are Coastal bermudagrass, common bermudagrass, kudzu, tall fescue (fig. 9), sericea lespedeza, annual lespedeza, crimson clover, and white clover.

Erosion is the chief hazard in cultivated areas. Contour tillage, terraces, vegetated outlets, stripcropping, and the use of adequately fertilized close-growing crops in the rotation are effective control measures.

One example of a suitable cropping system is—
First year: Cotton or corn. After harvest, mow stubble and leave unplowed all winter.
Second through sixth year: Plant sericea lespedeza and maintain a good stand.

A second example is—
First year: Corn. After harvest, mow stubble and leave unplowed all winter.
Second year: Cotton, followed by tall fescue and white clover in mowed, drilled, and ripped stubble.
Third through fifth year: Fescue and white clover.

A third example, suitable for Cecil and Lloyd sandy loams, is—
Corn, followed by Coastal bermudagrass.

An appropriate perennial in the cropping system helps to improve and maintain tilth and soil structure and is especially needed on the more eroded soils. If annuals are grown, keep all residues on the surface between seasons and on or near the surface, whichever is feasible, while a crop is growing.

Figure 9.—Tall fescue on Cecil sandy clay loam, 6 to 10 percent slopes, severely eroded.

Capability unit IVe-2

This unit consists of somewhat poorly drained or moderately well drained, moderately eroded or severely eroded upland soils that have firm or plastic subsoil. The slope range is 2 to 10 percent. These soils are—

Helena sandy loam, 6 to 10 percent slopes, eroded.
Helena sandy clay loam, 2 to 6 percent slopes, severely eroded.

The surface layer is sandy loam to sandy clay loam and is 3 to 10 inches thick. Beneath it is very firm or plastic, mottled clay and sandy clay.

These soils are low in natural fertility, low in organic-matter content, and strongly acid. Surface runoff is mostly rapid, and permeability is moderately slow or slow. The tilth is good to poor.

These soils occupy about three-tenths of 1 percent of the county. About 45 percent of their acreage is cultivated or pastured, and the rest is forested. They are poorly suited to many crops because their root zone is only moderately thick. Cotton, corn, and oats may be grown occasionally. Suitable pasture plants are common bermudagrass, tall fescue, white clover, and sericea lespedeza.

Erosion is the chief hazard. Contour tillage and stripcropping are needed to control surface runoff. The runoff from terraces should empty into previously established and heavily fertilized vegetated waterways.

For best results, row crops should be grown not more than 1 year out of 4 and should be followed by at least 3 years of deep-rooted perennials.

An example of a suitable cropping system is—
First year: Corn.
Second through fourth year: Sericea lespedeza.

Yields of pasture and hay improve if fertilizer and lime are applied, weeds are controlled by mowing or by use of herbicides, and grazing is controlled so as to maintain a vigorous growth.

Capability unit IVe-4

This unit consists of shallow or moderately deep, well-drained or excessively drained soils on the uplands. The slope range is 6 to 10 percent. These soils are—

Louisburg complex, 6 to 10 percent slopes.
Wilkes complex, 6 to 10 percent slopes, eroded.

The surface layer is loamy, and beneath it is a thin layer of sandy loam or sandy clay loam over partially weathered rock.

Natural fertility is low, and the organic-matter content is low. Surface runoff is medium or rapid. Permeability varies widely, and the available moisture capacity is low. The tilth is good to poor.

These soils occupy about half of 1 percent of the county. Most of the acreage is forested. Corn, cotton, grain sorghum, tall fescue, sericea lespedeza, and annual lespedeza are moderately well suited.

The low fertility, low available moisture capacity, and narrow range of suitable plants make cultivation of crops hazardous. Row crops should be grown not more than 1 year out of 4 and should be followed by at least 3 years of deep-rooted perennials.

An example of a suitable cropping system is—

First year: Corn or grain sorghum, followed by tall fescue.

Second, third, and fourth years: Sericea lespedeza, for grazing, seed, or hay.

These soils are suited to some pasture and hay plants. Yields improve if fertilizer and lime are applied, weeds are controlled by mowing or by use of herbicides, and grazing is controlled so as to maintain a vigorous growth.

Capability unit IVw–1

One land type, Alluvial land, wet, and one soil, Wehadkee silty clay loam, are in this unit. Both are wet and poorly drained. They occur on flood plains and are frequently flooded for long periods. The slope range is 0 to 2 percent. The surface layer is chiefly silty clay loam, but its texture varies. The water table is at or near the surface during the rainy season.

These areas are low in fertility, low in organic-matter content, and medium or strongly acid. Surface runoff is slow to ponded, and permeability is slow or very slow.

This unit occupies about four-tenths of 1 percent of the county. Five percent of it is in pasture, and the rest is in forest. It is suited to cultivated crops only if a complete drainage system is established and protection from flooding is provided. If drained, it is suited to corn, grain sorghum, or truck crops, and to such pasture and hay plants as bermudagrass, tall fescue, dallisgrass, white clover, and annual lespedeza (fig. 10).

Figure 10.—**Drainage on Wehadkee silty clay loam. Soil will be in pasture after it is adequately drained.**

If this unit is drained and protected from floods, a suitable cropping system is—

Corn grown continuously, if residues are incorporated into the soil and an occasional cover crop is grown to control diseases.

Yields of pasture and hay crops are better if fertilizer and lime are applied, weeds are controlled by mowing or by use of herbicides, and grazing is controlled so as to maintain a vigorous growth.

Capability unit Vw–1

The only soil in this unit, Worsham sandy loam, 2 to 6 percent slopes, is a poorly drained soil that occurs in depressions and around the head of drains on the uplands. It has a sandy loam surface layer, 4 to 9 inches thick, and mottled gray sandy clay subsoil that is slowly permeable.

This soil is seldom dry enough to work. It is low in natural fertility, contains little organic matter, and is strongly acid. The root zone is fairly thin.

This soil occupies about four-tenths of 1 percent of the county. About 45 percent of it is pastured. Poor drainage, slow lateral movement of water, and low fertility make this soil unsuitable for cultivated crops. Properly constructed ditches remove enough surface water so that some pasture plants can be grown, for example, bermudagrass, tall fescue, ryegrass, white clover, and dallisgrass. Large amounts of fertilizer are needed because of the low fertility of this soil. Weeds can be controlled by use of herbicides.

Capability unit VIe–2

In this unit are deep, well-drained, severely eroded soils on the uplands and gullied land complexes in valleys and on side slopes. The slope range is 6 to 25 percent. These soils are—

Cecil sandy loam, 15 to 25 percent slopes, eroded.
Cecil sandy clay loam, 10 to 15 percent slopes, severely eroded.
Cecil-Gullied land complex, 6 to 10 percent slopes.
Lloyd clay loam, 15 to 25 percent slopes, severely eroded.
Lloyd-Gullied land complex, 6 to 10 percent slopes.
Lloyd-Gullied land complex, 10 to 15 percent slopes.

The surface layer is sandy loam to sandy clay loam and is 3 to 8 inches thick. Beneath it is friable to firm sandy clay loam, clay, and sandy clay.

These soils are low in fertility, low in organic-matter content, and strongly acid. They are difficult to work because of the steep slopes and the poor tilth in severely eroded areas. Permeability is moderate, and the available moisture capacity is medium or low.

These soils cover more than 18 percent of the county. More than 90 percent of their acreage is in forest. Because of the slope and the severe erosion hazard, they are unsuited to cultivated crops. They are better suited to trees, such as loblolly pine and shortleaf pine, and to deep-rooted perennials. Bermudagrass, tall fescue, sericea lespedeza, kudzu, dallisgrass, crimson clover, and white clover are suitable pasture and hay plants.

In establishing pasture, it is advisable to till and plant on the contour and to protect the soils with a mulch all of the time, if possible. Grazing should be controlled so

as to prevent damage to vegetation. Special practices are needed to control gullies. All pasture plants require annual applications of phosphate and potash. Nonlegumes need nitrogen, and legumes respond to lime.

Capability unit VIe-3

This unit consists of slightly eroded or moderately eroded, shallow or moderately deep, well-drained to excessively drained upland soils on hillsides and valley slopes. The slope range is 10 to 15 percent. These soils are—

Louisburg complex, 10 to 15 percent slopes.
Wilkes complex, 10 to 15 percent slopes, eroded.

The surface layer is friable sandy loam and is 1 to 8 inches thick. The subsoil is either thin or absent.

These soils are low in natural fertility, low in organic-matter content, and slightly to strongly acid. Permeability is moderately rapid to moderately slow, and the available moisture capacity is low. The root zone is thin. Bedrock is near the surface, and it outcrops in places. The thin surface layer is generally hard to work because of the slope.

These soils occupy almost 2 percent of the county. Most of their acreage is in forest. They are not suited to cultivated crops, because they are droughty, shallow, and infertile. Best returns can be expected from trees, such as loblolly pine and shortleaf pine. Pastures must be permanent. They should be composed of deep-rooted plants, such as bermudagrass, tall fescue, annual lespedeza, sericea lespedeza, kudzu, dallisgrass, crimson clover, and white clover, and they require large amounts of fertilizer.

In establishing pasture, it is advisable to till and plant on the contour and to protect the soils at all times with mulch, plant residues, or suitable cover. Grazing should be controlled so as to prevent damage to vegetation. Annual applications of phosphate and potash are required. Legumes respond to applications of lime. The risk of erosion can be reduced by performing all forestry operations, such as planting seedlings, establishing firebreaks, and logging, on the contour.

Capability unit VIe-4

The one soil in this unit, Helena sandy clay loam, 6 to 10 percent slopes, severely eroded, has plastic clayey subsoil. The 4- to 6-inch surface layer is sandy clay loam. Beneath it is 7 to 18 inches of mottled, plastic, moderately slowly or slowly permeable sandy clay and clay.

This soil is low in natural fertility, contains little organic matter, and is strongly acid. The root zone ranges from thick to thin. The available moisture capacity is medium.

This soil occupies about two-tenths of 1 percent of the county and is mostly in forest. It is suited to pasture and hay plants, such as common bermudagrass, tall fescue, and kudzu.

To help control erosion, all tillage and planting should be on the contour, if possible. Applying fertilizer annually, liming occasionally, mulching, and controlling grazing will improve pastures. Loblolly pine and shortleaf pine are fairly well suited. The risk of erosion can be reduced by planting seedlings, establishing firebreaks, logging, and performing other forestry operations on the contour wherever this is practicable.

Capability unit VIIe-1

This unit consists of a severely eroded upland soil, Cecil sandy clay loam, 15 to 25 percent slopes, severely eroded, and a gullied land complex, Cecil-Gullied land complex, 10 to 15 percent slopes. The surface layer is firm to friable sandy clay loam and clay. Beneath it is red to dark-red, firm clay loam, clay, and sandy clay loam.

The areas in this unit are low in natural fertility, low in organic-matter content, and strongly acid. Permeability is moderate, and the available moisture capacity is medium or low.

This unit covers a little more than 1 percent of the county. About 95 percent of the acreage is in forest, and 5 percent is in pasture. The areas are not suitable for cultivation, because the slopes are steep, the soils are difficult to work, and the erosion hazard is severe. A permanent cover of deep-rooted perennials, such as kudzu or sericea lespedeza, can be established under good management. Shallow and deep gullies generally make it difficult to maintain pastures and to harvest hay. Loblolly pine and shortleaf pine can be grown. The risk of erosion can be reduced by planting seedlings, establishing firebreaks, logging, and performing other forestry operations on the contour wherever this is practicable.

Capability unit VIIe-2

This unit consists of steep, eroded, well-drained or excessively drained soils that are shallow and stony. The slope range is 15 to 25 percent. These soils are—

Louisburg stony complex, 15 to 25 percent slopes.
Wilkes complex, 15 to 25 percent slopes.

The surface layer is 2 to 15 inches thick and varies widely in texture. Beneath it is either clayey subsoil or partially weathered rock or bedrock.

These soils are low in natural fertility, low in organic-matter content, and predominantly strongly acid. Permeability and the available moisture capacity vary. Rock outcrops and boulders are common in some areas. The slope, stoniness, and gullies make these soils hard to work.

These soils occupy about three-tenths of 1 percent of the county. Most of their acreage is in forest. They are not suitable for cultivation. Perennial vegetation is limited chiefly to such plants as kudzu and sericea lespedeza, both of which are only moderately well suited. Loblolly pine and shortleaf pine can be grown. The risk of erosion can be reduced by planting seedlings, establishing firebreaks, logging, and performing other forestry operations on the contour wherever this is practicable.

Capability unit VIIe-4

This unit consists of one land type, Gullied land, which is made up of areas that were formerly Cecil, Lloyd, Appling, Helena, and Wilkes soils but are now intricate patterns of deep gullies. This acreage occupies about a tenth of 1 percent of the county. Most of it is in forest. Some is idle except for a few stunted trees. The intricate pattern of deep gullies prohibits the use of these areas for crops or pasture without expensive reclamation.

General Management of Cultivated Soils

Soils used for cultivated crops need management that maintains or improves natural fertility, provides protec-

tion from erosion, conserves moisture, maintains good tilth, and helps to control insects and diseases.

Fertilizer and lime.—For the most part, the soils of Morgan County are low in natural fertility; they do not contain enough nitrogen, phosphate, and potash to produce high yields of crops. Growing legumes frequently in the cropping system supplies part of the nitrogen needed by other crops. Incorporating crop residues into the soil and liming to keep the pH between 6.2 and 6.5 reduces the amount of phosphate and potash that becomes "fixed" (*6*);[2] that is, combined chemically with aluminum in the clay. The soils most likely to be seriously deficient in available phosphate due to "fixing" are the severely eroded soils on the uplands: Cecil sandy clay loam, Davidson clay loam, Helena sandy clay loam, and Lloyd clay loam. Davidson, Iredell, and Appling soils generally need larger applications of potash than do other soils in the county.

Yields of corn are increased by as much as 10 bushels per acre by placing fertilizer in continuous narrow bands 2 or 3 inches on either side, or on both sides, of the row and 2 or 3 inches below the level of the seed. Cotton yields also are increased by proper placement of fertilizer. The larger the amount of fertilizer, the farther the band should be from the seed. If fertilizer is placed too close to the crop row on a soil like Appling loamy coarse sand, a poor stand will result. Yields increase if part of the nitrogen is applied as a side dressing and is placed far enough to the side of the row so that it will not injure the plant roots, and deep enough so that it will not be disturbed by later cultivation (*4*).

Deep-rooted legumes, such as sericea lespedeza, alfalfa, and sweetclover, may be used in the cropping system to increase moisture penetration, improve soil structure, and add organic matter and nitrogen. Sericea lespedeza has the lowest fertility requirements of these three legumes. Alfalfa, now commonly grown for hay, not only requires enough lime to keep the reaction (pH) slightly acid or neutral, but also requires applications of boron, phosphate, and potash. Sweetclover has the highest fertility requirements. It needs enough lime to keep the reaction neutral or slightly alkaline. The soils of Morgan County are naturally acid. One or two tons of agricultural limestone per acre is necessary on most of the soils to keep the reaction in the slightly acid range and thus ensure good yields of other legumes. Best results are obtained if limestone is worked into the soil well in advance of seeding.

Manure.—Manure supplies nutrients, acts as a mulch, and improves the physical condition of the soil. Gardens generally should have first priority, vegetated waterways second, and severely eroded areas third. Manure is especially valuable in establishing grass and legumes in waterways and eroded areas.

Crop residues.—Crop residues should not be burned. Burning cotton and corn stalks and oat and wheat straw destroys organic matter that, if returned to the soil, would improve fertility and tilth, help to maintain structure, and keep the soil porous and permeable.

Corn grown continuously for grain provides enough crop residue to maintain the supply of organic matter in all soils of capability class I and subclasses IIw and IIIw, if a tall-growing variety of corn is planted, if the crop is managed so that it produces 60 bushels of grain to the acre, and if all crop residues are incorporated into the soil.

Tillage.—Excessive tillage results in loss of moisture, in crusting, and in compaction of the soil. Corn, cotton, and soybeans have for many years been considered as the most damaging of the soil-depleting crops, and much of the damage has resulted from overtillage in preparing seedbeds and controlling weeds (*11*).

Stirring the surface soil creates a dust mulch, which results in a net loss of moisture. The mulch reduces the upward movement of water, but it is likely to increase evaporation of the moisture already in the surface soil.

Cultivation increases the infiltration rate, but only temporarily. During the first hour of a storm, more water soaks into a cultivated soil than into an uncultivated one, but after the first hour the infiltration rate in a cultivated soil is about the same as that in an uncultivated soil.

Raindrops beat a bare soil into mud that forms a crust when the water evaporates. The crust reduces the amount of water and air that can enter the soil and prevents the emergence of seedlings. Special implements are needed to break up the surface crust. Tilling in such a way as to leave a mulch of coarse organic matter on the surface to break the impact of the rain helps to prevent crusting.

Compaction results from tillage when the soil is too wet, from the use of heavy implements, and from trampling by livestock. A soil that is low in organic-matter content is especially susceptible to compaction. As much as 75 percent more fuel is needed to pull a plow through a compacted soil than through a friable soil, and clods make it extremely difficult to prepare a good seedbed. Soil compaction can be controlled by limiting the use of heavy machinery, especially when the subsoil is wet. Including deep-rooted grasses and legumes in the cropping system, and applying large amounts of manure or other organic matter makes a soil less susceptible to compaction.

Mulch planting, which helps to prevent crusting, is beneficial in other ways also. It makes possible earlier planting following a cover crop or a grass or grain crop, increases yields, conserves moisture, reduces the cost of land preparation, and delays weed growth (*5*). Good results can be expected from the uneroded Altavista, Appling, Cecil, Chewacla, and Congaree soils. The eroded Cecil, Lloyd, and Davidson soils give good returns, but poor stands can be expected on the severely eroded spots included in these soils. Poor results should be expected from compacted soils until the compacted condition is corrected.

The use of chemicals reduces the need for tillage to control weeds and grasses.

Control of insects and soil-borne plant diseases.—The management of soils for control of insects must be based on a knowledge of their life history (*11*). Tillage, crop rotation, timing of planting, fertilization, irrigation, and field sanitation all help in the fight against noxious insects.

The practice of cutting cotton stalks or treating with chemicals after the last picking is most effective in controlling boll weevils and pink bollworms. Rotating crops often helps to reduce damage by insects that attack only a few kinds of plants. Plants grown in fertile soil are usually hardier, healthier, and more resistant to insects than those in poor soil. Barnyard manure, green-manure crops, and commercial fertilizer are of value in assisting

[2] Italic numbers in parentheses refer to Literature cited, p. 74.

plants to outgrow damage by insects. Nutrient deficiencies sometimes permit damage to roots by soil organisms that are harmless to healthy plants (*9*). A disease favored by acid soils and discouraged by the addition of lime is fusarium wilt of tomatoes and cotton. The removal of alternate host plants and food plants controls some insects.

Water conservation.—Conserving as much water in the soil as possible for use by plants during the growing season is important. Subsoiling, contour cultivation, stripcropping, and terracing reduce surface runoff. An adequate cover of a growing crop or crop residues on cultivated soils reduces evaporation and also helps to reduce runoff (*10*). Cropping systems should include deep-rooted legumes and grasses and crops, such as cotton and sorghum, that use moisture efficiently and therefore have greater ability to withstand drought. Well-fertilized plants make more efficient use of moisture in the surface soil, and they extend their roots into the subsoil and utilize stored moisture.

Irrigation.—Irrigation is a complex and expensive practice and is profitable only if it increases yields enough to offset the cost of equipment, fuel, and labor. The total rainfall in Morgan County is enough for high yields, but as shown in tables 6 and 8 of "Climate and Crops," a subsection of this report, droughts are to be expected in critical periods. Irrigation may be economically feasible in the production of cotton and truck crops and of pasture for temporary grazing. Further information on irrigation is given in the sections "Engineering Uses of Soils" and "Capability Groups of Soils." Conservation engineers, work-unit conservationists of the Soil Conservation Service, and county agents can be consulted in planning layout, cropping systems, and fertilization if irrigation is to be used.

Estimated Yields

Estimated yields of the principal crops grown in Morgan County are shown in table 3. These are estimates of yields that can be expected during an average year or of yields averaged over a 10-year period. Larger yields can be expected during years when rainfall and temperature

TABLE 3.—*Estimated acre yields of principal crops under two levels of management*

[The ratings in columns A indicate yields under common management; those in columns B indicate yields under improved management. Where no rating is given, the crop is not commonly grown on that soil]

Soil	Corn		Cotton		Oats		Sericea lespedeza for hay		Coastal bermudagrass for hay		Crimson clover and common bermudagrass for pasture	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Lb. of lint*	*Lb. of lint*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Animal-unit-days* [1]	*Animal-unit-days* [1]
Alluvial land	12	70	------	------	18	55	1.5	3.0	2.0	4.3	100	220
Alluvial land, moderately wet (drained)	20	60	------	------	20	55	------	------	1.0	3.1	80	180
Alluvial land, wet (drained)	0	30	------	------	------	------	------	------	------	------	------	180
Altavista sandy loam, 0 to 2 percent slopes	30	65	200	500	20	55	.8	2.5	1.5	5.0	90	195
Altavista sandy loam, 2 to 6 percent slopes	28	55	200	550	20	55	.8	2.5	1.5	4.5	75	165
Appling loamy coarse sand, 2 to 6 percent slopes	24	60	250	575	25	65	1.0	2.5	2.0	5.0	80	180
Appling loamy coarse sand, 2 to 6 percent slopes, eroded	22	50	250	550	25	60	1.0	2.5	2.0	5.0	75	175
Appling loamy coarse sand, 6 to 10 percent slopes, eroded	20	35	200	525	20	45	1.0	2.0	1.7	4.2	75	160
Appling sandy clay loam, 2 to 6 percent slopes, severely eroded	19	35	175	450	15	38	.7	1.8	1.0	4.0	70	130
Appling sandy clay loam, 6 to 10 percent slopes, severely eroded	18	30	150	400	10	30	.5	1.8	.9	3.8	70	120
Cecil sandy loam, 2 to 6 percent slopes	22	65	250	625	25	70	.8	3.2	2.2	5.2	90	220
Cecil sandy loam, 2 to 6 percent slopes, eroded	20	60	200	575	25	65	.8	3.0	2.0	5.0	80	200
Cecil sandy loam, 6 to 10 percent slopes, eroded	20	50	200	525	20	60	.7	2.8	2.0	4.7	75	175
Cecil sandy loam, 10 to 15 percent slopes, eroded	17	45	175	425	18	50	.6	2.5	1.2	4.0	70	165
Cecil sandy loam, 15 to 25 percent slopes, eroded	------	------	------	------	------	------	.4	2.0	------	------	65	140
Cecil sandy clay loam, 2 to 6 percent slopes, severely eroded	15	45	150	420	20	60	1.6	2.8	1.7	4.4	75	175
Cecil sandy clay loam, 6 to 10 percent slopes, severely eroded	12	40	100	400	15	45	.5	2.3	1.0	4.0	70	165
Cecil sandy clay loam, 10 to 15 percent slopes, severely eroded	------	------	------	------	------	------	.4	2.2	.8	3.0	65	150
Cecil sandy clay loam, 15 to 25 percent slopes, severely eroded	------	------	------	------	------	------	------	1.7	------	------	------	------
Cecil-Gullied land complex, 2 to 6 percent slopes	10	30	100	325	10	30	.5	2.5	1.0	3.4	50	135
Cecil-Gullied land complex, 6 to 10 percent slopes	------	------	------	------	------	------	.4	2.0	------	------	30	130

See footnote at end of table.

TABLE 3.—*Estimated acre yields of principal crops under two levels of management*—Continued

Soil	Corn		Cotton		Oats		Sericea lespedeza for hay		Coastal bermudagrass for hay		Crimson clover and common bermudagrass for pasture	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu	*Bu.*	*Lb. of lint*	*Lb. of lint*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Animal-unit-days* [1]	*Animal-unit-days* [1]
Cecil-Gullied land complex, 10 to 15 percent slopes								2.0				120
Chewacla silt loam (drained)	22	75				50			1.0	2.5	60	150
Colfax sandy loam, 2 to 6 percent slopes	12	35				30					30	110
Congaree silt loam	25	80			30	75	1.5	3.3	2.0	4.0	90	220
Davidson loam, 2 to 6 percent slopes, eroded	20	55	200	500	35	80	2.0	3.0	2.0	5.0	130	235
Davidson clay loam, 2 to 6 percent slopes, severely eroded	15	45	200	425	30	65	1.2	2.8	1.9	4.8	120	210
Davidson clay loam, 6 to 10 percent slopes, severely eroded	13	40	195	400	20	45	.7	2.6	1.4	4.0	120	210
Davidson clay loam, 10 to 15 percent slopes, severely eroded	10	30	155	300	18	35	.6	1.8	.8	3.0	110	200
Gullied land												
Helena sandy loam, 2 to 6 percent slopes, eroded	8	28	160	400	10	45	.5	1.6	.8	3.2	90	170
Helena sandy loam, 6 to 10 percent slopes, eroded	7	25	150	325	10	30	.5	1.1	.8	3.1	80	150
Helena sandy clay loam, 2 to 6 percent slopes, severely eroded	5	18	100	300	10	25	.4	1.2	.5	2.0	80	120
Helena sandy clay loam, 6 to 10 percent slopes, severely eroded							.3	.9	.5	2.0	80	110
Iredell sandy loam, 2 to 6 percent slopes	15	35	100	375	15	40	.5	1.6			100	190
Lloyd sandy loam, 2 to 6 percent slopes, eroded	20	60	300	575	35	70	.8	3.1	2.3	4.8	120	225
Lloyd sandy loam, 6 to 10 percent slopes, eroded	18	55	300	525	32	68	.5	3.0	2.1	4.6	110	210
Lloyd sandy loam, 10 to 15 percent slopes, eroded	15	45	250	500	30	60	.4	2.5	2.0	4.0	100	190
Lloyd clay loam, 2 to 6 percent slopes, severely eroded	16	45	250	425	30	65	.5	3.0	2.0	4.3	100	190
Lloyd clay loam, 6 to 10 percent slopes, severely eroded	13	40	200	375	20	50	.5	2.9	1.5	4.2	95	180
Lloyd clay loam, 10 to 15 percent slopes, severely eroded	12	30	100	250	13	35	.5	2.5	.8	3.0	80	140
Lloyd clay loam, 15 to 25 percent slopes, severely eroded							.4	1.9			20	110
Lloyd-Gullied land complex, 6 to 10 percent slopes					15	30	.5	2.0	.8	3.0	30	130
Lloyd-Gullied land complex, 10 to 15 percent slopes							.3	1.5				120
Local alluvial land	22	80	210	500	30	65	1.5	3.3	2.3	5.0	135	220
Louisburg complex, 6 to 10 percent slopes	8	20	100	225			1.0	1.5			10	130
Louisburg complex, 10 to 15 percent slopes							1.0	1.4				110
Louisburg stony complex, 15 to 25 percent slopes												
Vance sandy loam, 2 to 6 percent slopes, eroded	9	25	125	350	20	35	.6	1.9	.8	3.1	80	165
Vance sandy loam, 6 to 10 percent slopes, eroded	8	20	125	325	15	30	.6	1.7	.7	3.0	75	160
Wehadkee silty clay loam (drained)	0	40									0	150
Wickham fine sandy loam, 2 to 6 percent slopes, eroded	20	60	200	575	20	60	1.8	3.0	1.0	4.8	35	100
Wickham clay loam, 6 to 10 percent slopes, severely eroded	15	40	175	475	20	45	.7	2.5	.8	3.1	30	90
Wilkes complex, 2 to 6 percent slopes, eroded	8	20	110	290	12	28	.5	1.5	.8	3.0	45	100
Wilkes complex, 6 to 10 percent slopes, eroded	10	20	100	200			.5	1.8			25	100
Wilkes complex, 10 to 15 percent slopes, eroded							.4	1.5			20	95
Wilkes complex, 15 to 25 percent slopes							.3	1.4			20	80
Worsham sandy loam, 2 to 6 percent slopes (drained)											90	160

[1] Animal-unit-days, used to express the carrying capacity of pasture, is the product of the number of animal units grazed per acre, multiplied by the number of days that animals can graze without injury to the pasture.

are favorable and when there is little damage from insect infestation. Smaller yields are to be expected when prolonged drought occurs, when temperatures are unseasonably low, and when damage from insect infestation is extensive.

The "A" level shows the yields that can be expected under management that includes little use of fertilizer, improper tillage, little use of insecticides, and inadequate conservation measures. It does not take into account the widely varying losses from flooding. The "B" level shows the yields that can be expected under improved management and indicates the response of the soils to management. It does not reflect yields that can be expected on irrigated soils or on soils in experimental plots.

The figures in the B columns are based on recorded yields on individual farms; on yields obtained in long-term experiments; and on estimates made by agricultural workers who have had experience with the crops and the soils in the county. The management needed to obtain the yields listed in the B columns consists of the following practices: choosing suitable varieties of crops; preparing a good seedbed; using proper methods of planting; inoculating legume seeds; seeding at recommended rates and at proper times; controlling weeds; draining soils in the *w* subclasses; using the soils according to suggestions given in the capability unit section of this report; liming as required; and applying phosphate, potash, and nitrogen in recommended amounts.

Most soils have some characteristics that limit yields. Some of these are natural limitations, and some, such as erosion and compaction, are man made. Some soils have more limitations than others. For example, Louisburg complex, 6 to 10 percent slopes, will not produce as much under the same level of management as Lloyd sandy loam, 6 to 10 percent slopes, eroded. The Louisburg complex is well drained or excessively drained and consequently is leached of plant nutrients. It has a low available moisture capacity; hence, it holds only a small amount of water for a short period. Lloyd soils, in comparison, are deep and well drained. Water moves through them at a moderate rate, and they have medium capacity to hold water that plants can use. The yields in table 3 reflect all of these limitations.

Practical combinations of practices needed to obtain yields equal to the estimates in columns B are shown, by crops, in the following paragraphs.

Corn.—For soils that have an estimated yield of 70 bushels or more per acre (as shown in table 3), the requirements are—

70 to 100 pounds of nitrogen (N) and 60 to 70 pounds each of phosphoric acid (P_2O_5) and potash (K_2O).
10,000 to 15,000 plants per acre.
All crop residues or a winter cover crop returned to the soil.

For soils that have an estimated yield of 35 to 70 bushels per acre, the requirements are—

32 to 70 pounds of nitrogen (N) and 36 to 60 pounds each of phosphoric acid (P_2O_5) and potash (K_2O).
8,000 to 10,000 plants per acre.
All crop residues or a winter cover crop returned to the soil.

For soils that have an estimated yield of 18 to 35 bushels per acre, the requirements are—

16 to 32 pounds of nitrogen (N) and 16 to 36 pounds each of phosphoric acid (P_2O_5) and potash (K_2O).
5,000 to 8,000 plants per acre.

Cotton.—For soils that have an estimated yield of 500 pounds of cotton (lint) or more per acre, the requirements are—

60 to 96 pounds each of nitrogen (N), phosphoric acid (P_2O_5), and potash (K_2O).
24,000 to 30,000 plants per acre.
Effective insect-control program.

For soils that have an estimated yield of 300 to 500 pounds per acre, the requirements are—

36 to 60 pounds each of nitrogen (N), phosphoric acid (P_2O_5), and potash (K_2O).
16,000 to 25,000 plants per acre.
Effective insect-control program.

For soils that have an estimated yield of 150 to 300 pounds per acre, the requirements are—

12 to 36 pounds of nitrogen (N) and 16 to 36 pounds each of phosphoric acid (P_2O_5) and potash (K_2O).
12,000 to 18,000 plants per acre.
Insect-control program.

Oats.—For soils that have an estimated yield of more than 50 bushels per acre, the requirements are—

16 to 24 pounds of nitrogen (N) and 48 to 72 pounds each of phosphoric acid (P_2O_5) and potash (K_2O) applied at the time of planting; 32 to 64 pounds of nitrogen (N) applied late in winter.

For soils that have an estimated yield of 30 to 50 bushels per acre, the requirements are—

8 to 16 pounds of nitrogen (N) and 24 to 48 pounds each of phosphoric acid (P_2O_5) and potash (K_2O) at the time of planting; 16 to 32 pounds of nitrogen (N) applied late in winter.

Sericea lespedeza.—For soils that have an estimated yield of 2 tons or more per acre, the requirements are—

8 to 12 pounds of nitrogen (N), 24 to 36 pounds each of phosphoric acid (P_2O_5) and potash (K_2O), and 1 ton of lime applied at the time of seeding; 48 to 72 pounds each of phosphoric acid (P_2O_5) and potash (K_2O) applied annually; 1 ton of lime at least once in 3 years, or as needed, according to soil tests.

For soils that have an estimated yield of 1 to 2 tons per acre, the requirements are—

8 to 12 pounds of nitrogen (N) and 24 to 36 pounds each of phosphoric acid (P_2O_5) and potash (K_2O) applied annually; 1 ton of lime at least once in 3 years, or as needed, according to soil tests.

Soils that have an estimated yield of less than 1 ton commonly receive little or no fertilizer or lime after planting.

Bermudagrass and crimson clover.—For soils that have an estimated acre yield of 100 to 250 animal-unit days, the requirements are—

32 to 96 pounds of nitrogen (N), depending on the effectiveness of the clover in furnishing nitrogen to the grass; 48 to 96 pounds each of phosphoric acid (P_2O_5) and potash (K_2O); 1 ton of lime every 3 years, or as needed, according to soil tests.
Mowing to control excessive growth and weeds.

For soils that have an estimated acre yield of 90 to 150 animal-unit days, the requirements are—

16 to 48 pounds of nitrogen (N) and 24 to 48 pounds each of phosphoric acid (P_2O_5) and potash (K_2O); 1 ton of lime every 3 years, or as needed, according to soil tests.
Mowing to control excessive growth and weeds.

Soils that have an estimated acre yield of less than 90 animal-unit days commonly receive little fertilizer or lime or other treatment after planting.

Coastal bermudagrass.—For soils that have an estimated acre yield of 4 tons, the requirements are—

Good seedbed preparation.
24 pounds of nitrogen (N) and 48 pounds each of phosphoric acid (P_2O_5) and potash (K_2O) at planting time and annually thereafter, 76 pounds of nitrogen as a side dressing.
14,000 stolons per acre.
Lime every 3 years.

For soils that have an estimated acre yield of 2 tons, the requirements are—

Good seedbed preparation.
24 pounds of nitrogen (N) and 48 pounds each of phosphoric acid (P_2O_5) and potash (K_2O) at planting time and annually thereafter, 36 pounds of nitrogen as a side dressing.
14,000 stolons per acre.
Lime every 5 years.

Climate and Crops [3]

The range of rainfall and temperatures, shown in table 1 of this report, makes the climate of Morgan County suitable for growing a wide variety of crops. The soils are wet most of the winter (see table 4), but during some periods they are dry enough for plowing. Most crops are planted and become established during April, May, and June, when the moisture content is normally favorable for tillage and for germination of seed.

During a 10-year period, according to table 5, rainfall in excess of 2 inches can be expected seven times in March, once in April, and five times in May. During these periods, preparation of the soils and planting are delayed, and sloping soils that have just been prepared for planting are damaged considerably by erosion.

Small grains, clover, and many grasses are planted in fall, when moisture conditions are usually favorable. But according to table 6, there is, in 10 years, one period of 4 weeks with no day having .25 inch rainfall in September; there are four such periods in October and three in November. During such periods, germination is retarded and preparation of compacted soils is most difficult. Also, it is probable that a freeze will occur by November 2 in 2 years out of 10 (see table 7).

The frost-free season averages 225 days in Morgan County. This is long enough for practically all crops grown to mature, even though planting may be delayed in spring. Yields, especially of corn, are lower if the crop is planted late in spring.

[3] HORACE S. CARTER, State climatologist, U.S. Weather Bureau, assisted with the preparation of this section.

TABLE 4.—*Average number of days per year (by months) with rainfall equal to or greater than the stated amounts*

[10-year record through 1961]

Rainfall equal to or greater than—	Average number of days in—												
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Inches													
0.10	7	8	8	6	7	5	8	6	5	3	5	6	74
.25	5	6	6	4	5	3	5	5	4	3	3	5	54
.50	4	4	3	3	3	2	3	3	2	2	1	3	33

TABLE 5.—*Total number of days in 10 years (by months) with rainfall equal to or greater than the stated amounts*

Rainfall equal to or greater than—	Total number of days in—												
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	10-year period
Inches													
1.00	15	13	16	11	15	5	9	11	12	3	5	12	127
2.00	2	3	7	1	5	1	0	2	5	1	2	2	31
3.00	0	0	1	0	1	0	0	1	0	0	0	0	3
4.00	0	0	0	0	1	0	0	0	0	0	0	0	1

TABLE 6.—*Total number of 2-week, 4-week, and 6-week[1] periods in 10 years with no day having 0.25-inch or more of precipitation*

Periods equal to or longer than—	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	10-year period
2 weeks	4	4	1	8	5	9	3	6	11	7	7	5	70
4 weeks	1	0	0	1	1	1	0	0	1	4	3	0	12
6 weeks	0	0	0	0	1	0	0	0	0	3	1	0	5

[1] Dry periods are counted as occurring in the month having the most days in the period. For example, if the dry period begins the last week in September and extends through October and into November, it is counted as occurring in October.

TABLE 7.—*Probabilities of last freezing temperatures in spring and first in fall*

Probability	Dates for given probability and temperature		
	24° F.	28° F.	32° F.
Spring:			
1 year in 10 later than	March 18	April 6	April 15
2 years in 10 later than	March 14	March 28	April 10
5 years in 10 later than	March 1	March 14	March 25
Fall:			
1 year in 10 earlier than	November 13	November 9	October 28
2 years in 10 earlier than	November 19	November 11	November 2
5 years in 10 earlier than	November 29	November 24	November 10

Fall-planted crops usually survive well and make some growth when temperatures go above 40° F. There are normally enough low-temperature hours during each winter to meet the minimum requirement for a dormant season for peaches.

The data in tables 4, 5, 6, 7, and 8 are based on records of nearby stations.

Lists A and B can be used with table 8 to predict the likelihood of drought damage to a particular crop on a specified soil (*11*). In list A, find the name of the crop and the average depth of its root penetration. Then refer to list B, which gives the capacity of the soil types to hold moisture that plants can use to a depth of 12 inches, 24 inches, or 36 inches. When you have learned the available moisture capacity of the soil to the depth to which the roots of the crop will penetrate, refer to table 8, which will give the probability of drought days, by months, for soils of 1-inch, 2-inch, 3-inch, 4-inch, and 5-inch capacities.

LIST A: NORMAL ROOT ZONE FOR COMMON CROPS ON PERMEABLE SOILS

Eighty percent of roots at depth not exceeding—

12 inches	*24 inches*	*36 inches*
Annual lespedeza.	Bermudagrass.	Alfalfa.
Most garden vegetables.	Cantaloups.	Coastal bermudagrass.
Oats, rye, and wheat.	Crimson clover.	Fruit trees.
Ryegrass.	White clover.	Kudzu.
	Corn.	Sericea lespedeza.
	Cotton.	Sweetclover.
	Cowpeas.	
	Grain sorghum.	
	Lima beans.	
	Soybeans.	
	Tomatoes.	

LIST B: TOTAL AVAILABLE MOISTURE

Soils:	Approximate available moisture, in inches of water in soil from surface to a depth of—		
	12 inches	*24 inches*	*36 inches*
Alluvial land	2	4	5
Alluvial land, moderately wet	2	3	4
Alluvial land, wet	(1)	(1)	(1)
Altavista sandy loam	1	3	5
Appling loamy coarse sand	0.5	2	3
Appling sandy clay loam	1	3	5
Cecil sandy loam	2	3	5
Cecil sandy clay loam	(1)	3	5
Cecil-Gullied land complex	(1)	(1)	(1)
Chewacla silt loam	2	3	5
Colfax sandy loam	1	3	4
Congaree silt loam	2	4	5
Davidson loam	1	3	4
Davidson clay loam	1	3	4
Gullied land	(1)	(1)	(1)
Helena sandy loam	1	3	4
Helena sandy clay loam	2	3	4
Iredell sandy loam	1	2	4
Lloyd sandy loam	2	3	5
Lloyd clay loam	1	3	4
Lloyd-Gullied land complex	(1)	(1)	(1)
Local alluvial land	2	4	5
Louisburg complex	(1)	(1)	(1)
Louisburg stony complex	(1)	(1)	(1)
Vance sandy loam	1	3	4
Wehadkee silty clay loam	2	3	4
Wickham fine sandy loam	2	3	5
Wickham clay loam	1	3	5
Wilkes complex	(1)	(1)	(1)
Worsham sandy loam	1	2	3

[1] These soils and land types are not generally recommended for irrigation.

TABLE 8.—*Probabilities of drought days on soils of different moisture-storage capacities (12)*

Month [1]	Probability	Minimum drought days if soil has a moisture-storage capacity of [2]—				
		1 inch	2 inches	3 inches	4 inches	5 inches
April	1 in 10	16	0	0	0	0
	2 in 10	14	0	0	0	0
	3 in 10	12	0	0	0	0
	5 in 10	9	0	0	0	0
May	1 in 10	25	24	22	14	7
	2 in 10	22	20	16	9	0
	3 in 10	20	17	11	5	0
	5 in 10	16	12	0	0	0
June	1 in 10	24	23	23	21	18
	2 in 10	21	20	19	17	14
	3 in 10	20	18	17	14	11
	5 in 10	17	14	12	10	6
July	1 in 10	22	21	19	19	18
	2 in 10	19	17	15	15	14
	3 in 10	17	14	12	12	11
	5 in 10	14	9	8	7	6
August	1 in 10	22	19	18	17	16
	2 in 10	18	15	13	12	11
	3 in 10	16	12	10	8	7
	5 in 10	13	7	0	0	0
September	1 in 10	24	22	21	20	18
	2 in 10	21	18	16	15	13
	3 in 10	18	15	12	11	8
	5 in 10	16	10	7	0	0
October	1 in 10	28	28	25	25	24
	2 in 10	24	22	19	18	16
	3 in 10	20	18	15	12	10
	5 in 10	15	11	8	0	0

[1] Months of January, February, March, November, and December are not shown, because crops are rarely damaged by drought in these months.

[2] Moisture-storage capacity of soil is expressed as the inches of rainfall or irrigation water that a soil can hold and make available to plants.

Suppose, for example, you want to know the likelihood of drought damage to a corn crop grown on Cecil sandy loam. List A shows that 80 percent of the roots are in the uppermost 24 inches of soil. List B shows that Cecil sandy loam has the capacity to hold 3 inches of available moisture in the uppermost 24 inches. Table 8 shows that it is probable that in 5 years out of 10 there will be 12 days of drought in June and 8 days in July (*12*). If the duration of drought is 6 to 8 days at tasseling time, yields are reduced about 50 percent (*3*). Thus, for example, you weigh the cost of growing corn against the chance of drought and then decide if the increase in yields of grain will pay the cost of supplemental irrigation.

Use of Soils for Woodland [4]

In this section suggestions are given for woodland management, and the potential productivity and limitations of the soils for wood crops are discussed.

About half of the acreage of Morgan County is timberland. Loblolly pine is the principal commercial species on the uplands. Mixed stands of loblolly pine and shortleaf pine generally occur on the drier soils on ridgetops and upper slopes. Loblolly pine, yellow-poplar, sweetgum, blackgum, oak, and minor species grow on the bottom lands. Stocking conditions of the stands range from well stocked to scattered.

Both loblolly pine and shortleaf pine are important to the pulp and lumber industry. The better grades of bottom-land hardwoods are sold for veneer, and the poorer grades for lumber. Markets are adequate for all products.

Much progress has been made in woodland conservation within the past few years. Many landowners are following conservation plans that include a definite cutting cycle and a regulation harvest.

The soils of Morgan County have been placed in nine woodland groups on the basis of their suitability for wood crops. Each group consists of soils that have about the same suitability for wood crops, require about the same management, have about the same potential productivity, and are affected by similar soil-related hazards and limitations.

In table 9 these woodland groups are shown, and wood crops for the soils of each group are listed in order of their priority. The average site index is given in this table,

[4] T. A. MCFARLAND, forester, Soil Conservation Service, assisted in the preparation of this section.

TABLE 9.—*Woodland suitability groups, average site index, and*

Woodland group	Wood crop [1]	Average site index [2]	Plant competition
Group 1 Deep, highly productive, well-drained soils on flood plains. Alluvial land (Alm). Congaree silt loam (Con). Local alluvial land (Lcm).	Yellow-poplar Loblolly pine Sweetgum Oak-Gum	110 102 100 90	Severe
Group 2 Deep, well-drained, moderately permeable, productive soils on uplands. Cecil sandy loam (CYB, CYB2, CYC2, CYD2, CYE2). Davidson loam (DgB2). Lloyd sandy loam (LdB2, LdC2, LdD2).	Loblolly pine Yellow-poplar	80 85	Moderate
Group 3 Deep, moderately well drained or well drained, productive soils on stream terraces. Altavista sandy loam (AlA, AlB). Wickham fine sandy loam (WgB2).	Loblolly pine Shortleaf pine Upland oaks	82 71 75	Moderate
Group 4 Deep, well-drained, moderately permeable, severely eroded soils on the uplands and on stream terraces. Appling sandy clay loam (AnB3, AnC3). Cecil sandy clay loam (CZB3, CZC3, CZD3, CZE3). Cecil-Gullied land complex (CZB4, CZC4, CZD4). Davidson clay loam (DhB3, DhC3, DnD3). Lloyd clay loam (LeB3, LeC3, LeD3, LeE3). Lloyd-Gullied land complex (LeC4, LeD4). Wickham clay loam (WhC3).	Loblolly pine Shortleaf pine	74 63	Slight
Group 5 Well-drained or somewhat excessively drained soils on the uplands; coarse-textured surface layer; low available moisture capacity. Appling loamy coarse sand (AzB, AzB2, AzC2). Louisburg complex (LlC, LlD). Louisburg stony complex (LmE).	Loblolly pine Shortleaf pine Upland oaks	82 63 75	Slight
Group 6 Somewhat poorly drained or moderately well drained soils; firm or compact subsoil. Colfax sandy loam (CfB). Helena sandy loam (HYB2, HYC2). Vance sandy loam (VaB2, VaC2).	Loblolly pine Shortleaf pine Sweetgum Upland oaks	80 70 70 75	Moderate
Group 7 Moderately well drained or somewhat poorly drained soils; fine-textured, plastic subsoil; slow permeability. Helena sandy clay loam (HZB3, HZC3). Iredell sandy loam (IbB).	Sweetgum Upland oaks Shortleaf pine	70 67 60	Moderate
Group 8 Shallow or moderately shallow, well-drained to excessively drained soils on the uplands; low productivity; many management hazards. Wilkes complex (WpB2, WpC2, WpD2, WpE).	Loblolly pine Shortleaf pine	65 55	Slight
Group 9 Frequently flooded flood-plain soils; high water table; poorly drained upland seepage areas around head of drainageways. Alluvial land, moderately wet (Alp). Alluvial land, wet (Avp). Chewacla silt loam (Csl). Wehadkee silty clay loam (Weh). Worsham sandy loam (WkB).	Oak-Gum Yellow-poplar Sweetgum Loblolly pine	90 105 100 100	Severe

[1] Commercial species growing as a forest type on a particular soil. Wood crops are listed in order of importance.

[2] Site index is the average total height of dominant and codominant trees at 50 years of age. In use, the values given for each group should be considered as the central value of a site-index range of about 10 feet. These values may be used to obtain approximate volumetric

ratings for major limitations and hazards affecting management

Seedling mortality	Equipment limitations	Erosion hazard	Species priority	
			Native trees	Planted trees
Slight	Moderate	Slight	Yellow-poplar, loblolly pine, sweetgum, white oak, red oak.	Yellow-poplar, loblolly pine, sweetgum, cottonwood, sycamore.
Slight	Slight. (Moderate on slopes of more than 15 percent.)	Slight. (Moderate on slopes of more than 10 percent.)	Loblolly pine, shortleaf pine, yellow-poplar, red oak.	Loblolly pine, slash pine.
Slight to moderate	Slight	Slight	Loblolly pine, shortleaf pine, red oak.	Loblolly pine, slash pine.
Moderate	Moderate. (Severe on slopes of more than 15 percent.)	Severe	Loblolly pine, shortleaf pine	Loblolly pine, slash pine.
Moderate	Slight. (Moderate on slopes of more than 15 percent.)	Slight. (Moderate on slopes of more than 10 percent.)	Loblolly pine, red oak, shortleaf pine.	Loblolly pine, slash pine.
Moderate	Slight to moderate	Moderate. (Slight on slopes of less than 6 percent.)	Loblolly pine, shortleaf pine, sweetgum, red oak.	Loblolly pine, slash pine.
Moderate	Severe	Moderate to severe	Loblolly pine, shortleaf pine, sweetgum, red oak.	Loblolly pine, slash pine.
Severe	Moderate	Severe	Loblolly pine, shortleaf pine	Loblolly pine, slash pine.
Moderate	Severe	Slight	Yellow-poplar, loblolly pine, sweetgum, blackgum.	Yellow-poplar, sweetgum, cottonwood, sycamore.

growth and yield information by referring to appropriate published research. Site index information came from field measurements of forest stands growing on identified soils. Many of the measurements for loblolly pine were based on the Georgia Progress Report of Soil Survey Interpretations for Woodland Conservation (7).

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and also ratings of the limitations that affect management of each group. More specific and detailed information than can be shown in the table is given in the narrative descriptions of the woodland groups.

Site index is the average height, in feet, that the best (dominant and codominant) trees of a given species, growing on a specified soil, will reach in 50 years. The estimates of site indexes shown in this report are based on measurements of trees of different species, on published and unpublished records, and on the observations of technicians working with wood crops in the area.

The ratings shown in table 9 are explained in the following paragraphs.

Plant competition refers to the rate of invasion by unwanted trees, shrubs, and vines when openings are made in the canopy. Competition is *slight* if it does not prevent adequate natural regeneration and early growth or interfere with normal development of planted seedlings. It is *moderate* if it delays natural or artificial regeneration and slows the growth of seedlings but does not prevent the eventual development of a fully stocked normal stand. Competition is *severe* if it prevents adequate natural or artificial regeneration without intensive site preparation and without special maintenance practices, such as weeding.

Seedling mortality refers to the expected loss of seedlings as a result of unfavorable soil characteristics or topographic conditions, not as a result of plant competition. Even if healthy seedlings of a suitable species are correctly planted or occur naturally in adequate numbers, some will not survive if soil characteristics are unfavorable. Mortality is *slight* if less than 25 percent of the seedlings are expected to die, *moderate* if 25 to 50 percent mortality is expected, and *severe* if more than 50 percent of the seedlings are expected to die.

Equipment limitations result from soil characteristics and topographic features that restrict or prohibit the use of conventional equipment for planting and harvesting wood crops, for constructing roads, for controlling unwanted vegetation, and for controlling fires. The limitation is *slight* if there are no restrictions on the type of equipment or the time of the year that the equipment can be used. It is *moderate* if the use of equipment is restricted by one or more unfavorable characteristics, such as slope, stones or other obstructions, seasonal wetness, instability, or risk of injury to roots of trees. The limitation is *severe* if special equipment is needed and the use of such equipment is severely restricted by one or more of the unfavorable soil characteristics.

Erosion hazard refers to potential erosion when the soils are managed according to currently acceptable standards. The hazard is considered *slight* if problems of erosion control are unimportant. It is *moderate* if some attention must be given to controlling erosion. The hazard is *severe* if intensive treatments, special equipment, and special methods of operation must be planned to minimize soil deterioration.

Species priority indicates the species or forest types that are most suitable for planting and that should be favored in management if they occur in natural stands.

The nine woodland suitability groups are described on the following pages. The land type Gullied land was not assigned to a group.

Woodland suitability group 1

This group consists of deep, well-drained loamy soils in alluvial deposits on flood plains, in upland depressions, and at the head of drains. The available moisture capacity is medium or high. The water table is at an optimum depth most of the time. These soils are subject to occasional overflow of short duration. They are—

Alm	Alluvial land.
Con	Congaree silt loam.
Lcm	Local alluvial land.

If properly drained, these soils are suited to cultivated crops or to pasture. They are also highly productive of wood crops because of their relatively high available moisture capacity. About half of the acreage is now in woodland. The stocking, growth, quality, and vigor of the bottom-land hardwoods grown on these soils varies, depending on past cutting practices. If properly managed, however, good stands of young saplings of yellow-poplar, loblolly pine, sweetgum, and blackgum yield high-quality veneer wood.

The abundance of moisture causes a severe problem of competition from unwanted trees, shrubs, and vines whenever openings are made in the canopy. Control of this competition is necessary in the establishment of a new stand.

Conventional logging equipment generally can be used except during the rainy season in winter. At this time there are likely to be periods of several days when the soils are too wet for logging.

Woodland suitability group 2

This group consists of deep, well-drained, moderately permeable soils on the uplands. These soils are slightly or moderately eroded. The slope range is 2 to 25 percent. The available moisture capacity is medium. The surface layer is sandy loam or loam. Beneath the surface layer is sandy clay loam to clay. These soils are—

CYB	Cecil sandy loam, 2 to 6 percent slopes.
CYB2	Cecil sandy loam, 2 to 6 percent slopes, eroded.
CYC2	Cecil sandy loam, 6 to 10 percent slopes, eroded.
CYD2	Cecil sandy loam, 10 to 15 percent slopes, eroded.
CYE2	Cecil sandy loam, 15 to 25 percent slopes, eroded.
DgB2	Davidson loam, 2 to 6 percent slopes, eroded.
LdB2	Lloyd sandy loam, 2 to 6 percent slopes, eroded.
LdC2	Lloyd sandy loam, 6 to 10 percent slopes, eroded.
LdD2	Lloyd sandy loam, 10 to 15 percent slopes, eroded.

In the less sloping areas these soils are generally in cultivated crops or in pasture. They are also good sites for loblolly and shortleaf pine. Both species are valuable for lumber and pulpwood. Stands of loblolly pine predominate in the wetter areas, and mixed stands of loblolly and shortleaf pine grow in the drier locations. Although Morgan County is north of the natural range for slash pine, this species grows well on these soils, and some slash pine is planted each year because of its resistance to tipmoth damage. Generally, larger acreages are planted to loblolly pine because of the risk of ice damage to slash plantations.

The soils in this group are practically free of management hazards. On some of the lower slopes where there is an accumulation of moisture, however, plant competition is sufficient to restrict the growth of the species under management.

Woodland suitability group 3

This group consists of deep, well drained and moderately well drained soils on stream terraces. These soils are nearly level or very gently sloping and slightly or moderately eroded. They are moderately permeable and have medium available moisture capacity. The surface layer is sandy loam or fine sandy loam and overlies sandy clay loam and clay loam. These soils are—

AlA	Altavista sandy loam, 0 to 2 percent slopes.
AlB	Altavista sandy loam, 2 to 6 percent slopes.
WgB2	Wickham fine sandy loam, 2 to 6 percent slopes, eroded.

These are good crop and pasture soils. Consequently, only about a third of their acreage in Morgan County is in woodland. They are productive of loblolly pine and shortleaf pine. The relatively high water table recedes during the dry summer months and leaves only a moderate moisture supply. This decreased moisture supply and a moderate erosion problem, which has already affected the Wickham soil, result in a probable seedling mortality of between 25 and 50 percent, depending on the duration of summer droughts.

Woodland suitability group 4

This group consists of deep, well-drained, severely eroded or gullied soils on ridges and side slopes. These soils are generally moderately permeable and have medium or low available moisture capacity. The surface layer is sandy clay loam or clay loam and overlies sandy clay loam to clay. These soils are—

AnB3	Appling sandy clay loam, 2 to 6 percent slopes, severely eroded.
AnC3	Appling sandy clay loam, 6 to 10 percent slopes, severely eroded.
CZB3	Cecil sandy clay loam, 2 to 6 percent slopes, severely eroded.
CZC3	Cecil sandy clay loam, 6 to 10 percent slopes, severely eroded.
CZD3	Cecil sandy clay loam, 10 to 15 percent slopes, severely eroded.
CZE3	Cecil sandy clay loam, 15 to 25 percent slopes, severely eroded.
CZB4	Cecil-Gullied land complex, 2 to 6 percent slopes.
CZC4	Cecil-Gullied land complex, 6 to 10 percent slopes.
CZD4	Cecil-Gullied land complex, 10 to 15 percent slopes.
DhB3	Davidson clay loam, 2 to 6 percent slopes, severely eroded.
DhC3	Davidson clay loam, 6 to 10 percent slopes, severely eroded.
DhD3	Davidson clay loam, 10 to 15 percent slopes, severely eroded.
LeB3	Lloyd clay loam, 2 to 6 percent slopes, severely eroded.
LeC3	Lloyd clay loam, 6 to 10 percent slopes, severely eroded.
LeD3	Lloyd clay loam, 10 to 15 percent slopes, severely eroded.
LeE3	Lloyd clay loam, 15 to 25 percent slopes, severely eroded.
LeC4	Lloyd-Gullied land complex, 6 to 10 percent slopes.
LeD4	Lloyd-Gullied land complex, 10 to 15 percent slopes.
WhC3	Wickham clay loam, 6 to 10 percent slopes, severely eroded.

The soils of this group support two-thirds of all the woodland in the county. They are fair sites for the production of loblolly pine and shortleaf pine. Shortleaf pine generally grows on the drier, more eroded areas, and loblolly pine on the better locations where there is more moisture. Most of the surface layer and part of the subsoil have already been removed by erosion, and the hazard of further erosion is severe. The severe erosion damage has caused other management limitations. Loss of 25 to 50 percent of either planted or naturally reseeded seedlings generally can be expected. Where gullying prevents uniform penetration of moisture, more than half of the stand may be lost. Most of the small gullied areas that have a partial stand of trees have become stabilized, but there are some large gullies in which erosion is very active. Little or no logging should be attempted in these gullied areas unless measures are taken to control erosion. Following a rainy season, conventional logging in the gullied areas is restricted until the soils have dried out.

Woodland suitability group 5

This group consists of well-drained to somewhat excessively drained upland soils that have a coarse-textured surface layer. The slope range is 2 to 25 percent. Permeability is moderate to rapid. The available moisture capacity of the surface layer is low. The soils are—

AzB	Appling loamy coarse sand, 2 to 6 percent slopes.
AzB2	Appling loamy coarse sand, 2 to 6 percent slopes, eroded.
AzC2	Appling loamy coarse sand, 6 to 10 percent slopes, eroded.
LlC	Louisburg complex, 6 to 10 percent slopes.
LlD	Louisburg complex, 10 to 15 percent slopes.
LmE	Louisburg stony complex, 15 to 25 percent slopes.

These soils are productive of loblolly pine and shortleaf pine, once a stand is established. Stands are somewhat difficult to establish because of rapid water movement and the low available moisture capacity of the coarse-textured surface layer. Seedling mortality is the only management hazard. Losses are likely to be as high as 50 percent if a drought occurs following the planting or seeding.

Woodland suitability group 6

This group consists of deep, somewhat poorly drained or moderately well drained soils on gentle slopes and in depressions on the uplands. Permeability is moderately slow or slow, and the available moisture capacity is medium or moderately low. The water table is high during wet periods. The sandy loam surface layer overlies firm sandy clay loam to clay. These soils are—

CiB	Colfax sandy loam, 2 to 6 percent slopes.
HYB2	Helena sandy loam, 2 to 6 percent slopes, eroded.
HYC2	Helena sandy loam, 6 to 10 percent slopes, eroded.
VaB2	Vance sandy loam, 2 to 6 percent slopes, eroded.
VaC2	Vance sandy loam, 6 to 10 percent slopes, eroded.

Management problems result from a high water table during the germination period, followed by drying and a low moisture supply in summer. These soils are fair sites for both loblolly pine and shortleaf pine. Sweetgum is encouraged to germinate while the water table is high, but the timber is not of good enough grade to be suitable for high-quality products, such as veneer. Gum is usually considered competing vegetation and is controlled in favor of pine. The erosion hazard may limit the use of conventional logging equipment on the Helena and Vance soils for several days following wet spells. Also, the drying and hardening of these soils in summer sometimes results in seedling mortality of as much as 50 percent following planting or seeding.

Woodland suitability group 7

This group consists of deep or moderately deep, moderately well drained or somewhat poorly drained soils on the uplands. These soils have firm or very plastic subsoil. The water table is high for varying periods. Permeability is moderately slow to very slow, and the available moisture capacity is medium. The slope range is 2 to 10 percent. These soils are—

- HZB3 Helena sandy clay loam, 2 to 6 percent slopes, severely eroded.
- HZC3 Helena sandy clay loam, 6 to 10 percent slopes, severely eroded.
- IbB Iredell sandy loam, 2 to 6 percent slopes.

Less than half of 1 percent of the woodland in the county consists of these soils. There are many management hazards. Much of the acreage is already severely eroded. Because of the variable water table and the heavy plastic subsoil, there are very few days during the year when the soils are not too wet or too dry for planting or logging, and they may remain too wet for logging all winter. Competing vegetation that has become established during the wet periods limits the growth of desired species. Seedling mortality during dry weather is likely to be as high as 50 percent.

Woodland suitability group 8

This group consists of well-drained to excessively drained, shallow or moderately shallow, unproductive soils on the uplands. The slope range is 2 to 25 percent. The available moisture capacity is low. These soils are—

- WpB2 Wilkes complex, 2 to 6 percent slopes, eroded.
- WpC2 Wilkes complex, 6 to 10 percent slopes, eroded.
- WpD2 Wilkes complex, 10 to 15 percent slopes, eroded.
- WpE Wilkes complex, 15 to 25 percent slopes.

These soils are low in productivity but support mixed stands of loblolly pine and shortleaf pine. Although erosion damage is not generally severe, the erosion hazard is serious during logging and care is necessary in locating roads and skid trails, especially on the steeper slopes. Some of the rougher, drier slopes are so low in fertility and in available moisture that more than half of the stand may be lost following planting or seeding. In some of the critical areas, about all that woodland management can provide is a protective cover for the soil.

Woodland suitability group 9

This group consists of soils that are frequently flooded and have a water table near the surface most of the time, and of poorly drained soils in seepage areas on the uplands and around the head of drains. These soils are—

- Alp Alluvial land, moderately wet.
- Avp Alluvial land, wet.
- Csl Chewacla silt loam.
- Weh Wehadkee silty clay loam.
- WkB Worsham sandy loam, 2 to 6 percent slopes.

These soils are highly productive of the best bottom-land hardwoods in the county, and also of loblolly pine in spots that become dry enough during the germination period. Plant competition is severe. Unwanted plants invade immediately when the canopy is opened up. Because of frequent flooding, it is hard to get a stand established, except in dry years. Some seedling mortality can be expected if excess water covers the seedlings for several weeks. The use of conventional logging equipment on these soils is usually restricted to the summer months.

Use of Soils for Wildlife and Fish [5]

Most of the soils of Morgan County are suited to and support one or more species of wildlife. Some species frequent woodland; others prefer open farmland; and many require a water habitat.

Bobwhites, mourning doves, rabbits, squirrels, and many kinds of nongame birds are common throughout the county. Deer and wild turkeys require extensive areas of well-watered woodland. The long, narrow bottom lands along streams are well suited to wild ducks and beavers. Farm ponds provide excellent fishing. There were about 360 farm ponds in the county at the time of this survey, and about 25 are being added each year.

TABLE 10.—*Suitability of plants to soils, by wildlife suitability groups*

[A rating of 1 indicates that the plant is suited to the soils; 2 indicates marginal suitability; and 3 indicates that the plant is either poorly suited or not suitable]

Plant	Soil groups								
	1	2	3	4	5	6	7	8	9
Beech	2	2	3	3	1	2	1	2	3
Blackberry	1	1	2	3	1	2	1	1	3
Blackgum	1	1	3	3	2	3	1	1	3
Browntop millet	1	3	2	3	1	3	1	1	3
Buttonclover	1	3	2	3	3	3	1	2	3
Cherry, black (wild)	1	1	3	3	2	2	1	2	3
Clover, crimson	1	3	2	3	2	3	1	2	3
Clover, white	1	3	3	3	2	3	1	1	2
Corn	1	3	2	3	2	3	1	2	3
Cowpeas	1	3	2	3	2	3	1	2	3
Dewberry	1	2	2	2	1	3	2	2	3
Dogwood, flowering	1	1	2	3	1	2	1	2	3
Fescue, tall	1	2	2	3	2	3	1	1	2
Grapes, wild	1	1	2	2	2	2	1	2	1
Greenbrier	1	2	2	2	1	2	1	2	3
Hackberry	1	2	2	3	2	3	1	2	1
Hickory	1	1	3	3	2	2	1	2	3
Honeysuckle	1	3	2	3	1	3	1	2	3
Japanese millet	1	3	3	3	3	3	1	1	1
Lespedeza, annual	1	2	1	2	1	3	1	2	3
Lespedeza, bicolor	1	2	1	2	1	3	1	3	3
Mulberry	1	2	3	3	2	3	1	2	3
Oak [1]	1	2	3	3	2	[2]2	1	2	1
Oats (forage)	1	3	2	3	1	3	1	3	3
Pecan	1	2	3	3	3	3	1	2	3
Pine (loblolly and shortleaf)	1	1	2	2	1	2	1	2	3
Ragweed, common	1	3	2	3	1	3	1	3	3
Rescuegrass	1	3	2	3	1	3	1	2	3
Ryegrass	1	3	2	3	1	3	1	2	3
Smartweed	3	3	3	3	3	3	2	1	1
Sorgum, grain [3]	3	3	3	3	3	3	3	3	3
Sweetgum	1	1	2	3	2	3	1	1	2
Tickclover (beggarlice)	1	2	1	2	1	3	1	3	3
Wheat (forage)	1	3	2	3	2	3	1	3	3

[1] Suitable oaks are black oak, blackjack oak, northern red oak, pin oak, post oak, sawtooth oak, scarlet oak, Shumard oak, southern red oak, water oak, white oak, and willow oak.

[2] Overcup is the only oak suited to group 6.

[3] Grain sorghum is a choice food of most wildlife that feed on grain. Nevertheless, it is limited in value and suitability because the humid climate causes it to rot and because it attracts undesirable birds, such as blackbirds, cowbirds, and sparrows.

[5] Information compiled by R. D. WELLS, soil scientist, and VERNE E. DAVISON, Washington field biologist, Soil Conservation Service, was used in the preparation of this section.

The soils of the county have been placed in nine groups on the basis of their suitability as habitats for specified kinds of wildlife. A description of each group is given in this section of the report. Table 10 rates the suitability of specific plants to the soils of each group. Table 11 rates the suitability of each of these plants as food for particular kinds of birds and animals. Cover for wildlife is no problem. The climate is such that cover can be grown readily if needed.

Practical help in planning and establishing a habitat for fish or wildlife may be obtained from the work unit conservationist of the Soil Conservation Service.

A summary of the food and habitat needs of the more important wildlife species in Morgan County follows.

BEAVER.—Beavers eat only vegetation, mostly bark, roots, and green plants. Tender bark or the cambium of alder, ash, birch, cottonwood, maple, pine, sweetgum, and willow are their principal tree foods. Beavers also eat honeysuckle, grasses, weeds, and the tender shoots of elder. Acorns and corn also are choice foods. The chief feeding areas are within 150 feet of water.

BOBWHITE.—Choice foods include acorns, beechnuts, blackberries, browntop millet, wild black cherries, corn, cowpeas, dewberries, flowering dogwood, annual lespedeza, bicolor lespedeza, mulberries, pecans, pine, common ragweed, sweetgum, and tickclover. Bobwhites also eat many insects. The food must be close to vegetation that provides shade and protection from predators and adverse weather.

TABLE 11.—*Suitability of various plants as food for wildlife*

[A rating of 1 indicates that the plant is choice food (attractive and nutritious); 2 indicates the plant is fair (useful when choice foods are gone); and 3 indicates the plant is unimportant (may be eaten in small amounts)]

Plant	Part of plant eaten	Bobwhite	Deer	Dove	Duck	Rabbit	Squirrel	Turkey	Nongame birds [1]		
									Fruit eaters	Grain and seed eaters	Nut and acorn eaters
Beech	Nuts	1	2	3	1	3	1	1	3	3	1
Blackberry	Fruit	1	3	3	3	3	2	1	1	3	3
	Foliage	3	2	3	3	3	3	3	3	3	3
Blackgum	Fruit	2	3	3	3	3	1	2	1	3	2
Browntop millet	Seed	1	3	1	1	3	3	1	3	1	3
Buttonclover	Foliage	3	1	3	3	1	3	1	3	3	3
Cherry, black	Fruit	1	3	3	3	3	1	2	1	3	2
Clover, crimson	Foliage	2	1	3	3	1	3	1	3	3	3
Clover, white	Foliage	2	1	3	3	1	3	1	3	3	3
Corn	Seed	1	1	1	1	1	1	1	3	1	2
Cowpeas	Seed	1	1	2	3	1	3	1	3	3	3
Dewberry	Fruit	1	3	3	3	3	2	2	1	3	3
Dogwood, flowering	Fruit	1	3	3	3	3	1	1	1	3	3
Fescue, tall	Foliage	3	2	3	3	2	3	2	3	3	3
Grapes, wild	Fruit	3	3	3	3	3	2	1	1	3	3
Greenbrier	Foliage	3	1	3	3	1	3	3	3	3	3
Hackberry	Fruit	2	3	3	3	3	2	1	1	3	3
Hickory	Nuts	3	3	3	3	3	1	2	3	3	1
Honeysuckle	Foliage	3	1	3	3	2	3	3	3	3	3
Japanese millet	Seed	1	3	1	1	3	3	2	3	1	3
Lespedeza, annual	Foliage	3	1	3	3	2	3	3	3	3	3
	Seed	1	3	3	3	3	3	2	3	3	3
Lespedeza, bicolor	Foliage	3	1	3	3	2	3	3	3	3	3
	Seed	1	3	3	3	3	3	3	3	3	3
Mulberry	Fruit	1	2	3	3	3	1	1	1	3	3
Oak	Acorns	1	1	3	1	3	1	1	3	3	1
Oats	Foliage	3	1	3	3	1	3	1	3	3	3
	Seed	2	3	2	3	3	3	3	3	3	3
Pecan	Nut	1	2	3	3	3	1	1	3	3	1
Pines	Seed	1	3	1	3	3	1	1	3	1	1
Ragweed, common	Seed	1	3	1	3	3	3	3	3	1	3
Rescuegrass	Foliage	3	1	3	3	1	3	1	3	3	3
Ryegrass	Foliage	3	1	3	3	1	3	1	3	3	3
Smartweed	Seed	3	3	3	1	3	3	3	3	3	3
Sorghum, grain [2]	Seed	1	1	1	1	1	1	1	3	1	3
Sweetgum	Seed	1	3	1	3	3	2	2	3	1	3
Tickclover (beggarlice)	Foliage	3	1	3	3	3	3	3	3	3	3
	Seed	1	3	3	3	3	3	2	3	3	3
Wheat	Foliage	3	1	3	3	1	3	1	3	3	3
	Seed	1	3	1	3	1	3	1	3	1	3

[1] Bluebirds, catbirds, mocking birds, and waxwings are some of the birds that eat fruit. The grain and seed eaters are the blackbirds, cardinals, meadowlarks, sparrows, and towhees. Chickadees, grackles, bluejays, titmice, and woodpeckers eat nuts and acorns.

[2] Grain sorghum is a choice food of most grain feeders; however, it attracts flocks of unwanted birds, such as blackbirds, cowbirds, and sparrows. Grain sorghum also rots quickly in this humid climate. These two factors limit its value and suitability as a wildlife food.

DEER.—Choice foods include acorns, bahiagrass, clover, corn, cowpeas, greenbrier, honeysuckle, annual lespedeza, bicolor lespedeza, oats, rescuegrass, ryegrass, and wheat. There is usually adequate cover in woodlands of 500 acres or more.

DOVE, MOURNING.—Choice foods are browntop millet, corn, Japanese millet, pine seed, common ragweed, and sweetgum. Doves do not eat insects, green leaves, or fruits. They drink water daily.

DUCK.—Choice foods are acorns, beechnuts, browntop millet, corn, Japanese millet, and smartweed. These foods must be covered with water to be readily available to ducks, but occasionally ducks will eat acorns and corn on dry land.

RABBIT.—Cover, such as blackberry or plum thicket, is a requirement in rabbit habitats. Choice foods are clover, winter grasses, and other succulent vegetation.

SQUIRREL.—Choice foods are acorns, beechnuts, blackgum, black cherries, corn, flowering dogwood, hickory nuts, mulberries, pecans, and pine seed.

TURKEY, WILD.—Turkeys generally survive only in areas of woodland that cover 2,000 acres or more. They need water for daily drinking and often roost in large trees over or near water. Choice foods include insects, acorns, bahiagrass, beechnuts, blackberries, dewberries, browntop millet, clover leaves, corn, cowpeas, flowering dogwood, wild grapes, hackberries, mulberries, oats, pecans, pine, rescuegrass, ryegrass, and wheat.

NONGAME BIRDS.—Different species of nongame birds have different food requirements. Several species eat nothing but insects. A few eat insects and fruits. Others eat insects, acorns, other nuts, and fruit.

FISH.—The principal game fish are bass, bluegill, and channel catfish. The choice foods of bluegills are aquatic worms, insects, and insect larvae. Bass and channel catfish feed on small fish. The supply of food depends on the fertility of the water, on the nature of the soils of the watershed, and somewhat on the nature of the soils in the bottom of the pond. For the most part, the ponds in Morgan County are low in fertility and the surrounding soils are acid. Consequently, fertilizer and lime are needed in ponds to ensure the production of an adequate supply of food for fish.

Wildlife suitability group 1

This group consists of deep, mostly well-drained soils on the uplands and stream terraces. The slope range is 0 to 10 percent. The surface layer ranges from loam to loamy coarse sand. A few areas are gravelly. The subsoil is moderately permeable clay to sandy clay loam. These soils are easily worked. In most areas the available moisture capacity is medium, but it is low in the surface layer of some of the loamy coarse sands. The erosion hazard is slight to moderate. The soils are—

Altavista sandy loam, 0 to 2 percent slopes.
Altavista sandy loam, 2 to 6 percent slopes.
Appling loamy coarse sand, 2 to 6 percent slopes.
Appling loamy coarse sand, 2 to 6 percent slopes, eroded.
Appling loamy coarse sand, 6 to 10 percent slopes, eroded.
Cecil sandy loam, 2 to 6 percent slopes.
Cecil sandy loam, 2 to 6 percent slopes, eroded.
Cecil sandy loam, 6 to 10 percent slopes, eroded.
Davidson loam, 2 to 6 percent slopes, eroded.
Lloyd sandy loam, 2 to 6 percent slopes, eroded.
Lloyd sandy loam, 6 to 10 percent slopes, eroded.
Wickham fine sandy loam, 2 to 6 percent slopes, eroded.

These soils cover slightly more than one-fourth of the county, and about 34 percent of the acreage is cultivated or pastured. They are suited to many plants that provide choice food for several species of wildlife. Because of their position and slope, these soils are generally not suited to flooding for duck fields. There are streams that can be dammed to form ponds.

Wildlife suitability group 2

This group consists of deep, well-drained soils on the uplands. The slope range is 10 to 25 percent. The surface layer is sandy loam. The subsoil is moderately permeable clay or sandy clay loam. Because of steep slopes, these soils are difficult to work and are highly susceptible to erosion. The available moisture capacity is medium. The soils are—

Cecil sandy loam, 10 to 15 percent slopes, eroded.
Cecil sandy loam, 15 to 25 percent slopes, eroded.
Lloyd sandy loam, 10 to 15 percent slopes, eroded.

These soils are extensive and are well distributed throughout the county. Much of their acreage is wooded. They are suited to blackgum, wild black cherry, flowering dogwood, hickory, and pine. Because of steep slopes, they are marginal for annual lespedeza, bicolor lespedeza, perennial grasses, and some woody plants, and generally are unsuited to other annual plants. Many streams can be dammed to form ponds.

Wildlife suitability group 3

This group consists of deep, well-drained, severely eroded soils on the uplands and high stream terraces. The slope range is 2 to 10 percent. The surface layer is sandy clay loam or clay loam. The subsoil is moderately permeable clay to clay loam. These soils have a medium or low available moisture capacity. Tilth is poor. The soils are—

Appling sandy clay loam, 2 to 6 percent slopes, severely eroded.
Appling sandy clay loam, 6 to 10 percent slopes, severely eroded.
Cecil sandy clay loam, 2 to 6 percent slopes, severely eroded.
Cecil sandy clay loam, 6 to 10 percent slopes, severely eroded.
Davidson clay loam, 2 to 6 percent slopes, severely edoded.
Davidson clay loam, 6 to 10 percent slopes, severely eroded.
Lloyd clay loam, 2 to 6 percent slopes, severely eroded.
Lloyd clay loam, 6 to 10 percent slopes, severely eroded.
Wickham clay loam, 6 to 10 percent slopes, severely eroded.

These soils are extensive throughout the county. Nearly all of the acreage has been cultivated in the past. Dewberry, lespedeza, pine, and tickclover are suitable plants. Because of poor tilth and severe erosion, wildlife food plantings are difficult to establish and maintain. These soils are marginal for cultivated crops, clover, grasses, small grain, and most shrubs and hardwood trees. Many streams can be dammed to form ponds.

Wildlife suitability group 4

This group consists of well-drained, severely eroded soils and areas of gullied land on the uplands. The slope range is 2 to 25 percent. The surface layer ranges from sandy clay loam to clay. The subsoil is moderately permeable, but water moves into the soil slowly. Tilth is poor. The available moisture capacity is low or medium. The erosion hazard is very severe. The soils are—

Cecil sandy clay loam, 10 to 15 percent slopes, severely eroded.
Cecil sandy clay loam, 15 to 25 percent slopes, severely eroded.

Cecil-Gullied land complex, 2 to 6 percent slopes.
Cecil-Gullied land complex, 6 to 10 percent slopes.
Cecil-Gullied land complex, 10 to 15 percent slopes.
Davidson clay loam, 10 to 15 percent slopes, severely eroded.
Gullied land.
Lloyd clay loam, 10 to 15 percent slopes, severely eroded.
Lloyd clay loam, 15 to 25 percent slopes, severely eroded.
Lloyd-Gullied land complex, 6 to 10 percent slopes.
Lloyd-Gullied land complex, 10 to 15 percent slopes.

These soils are extensive throughout the county. Most of the acreage has been cultivated in the past, but much of it is reverting to pine. Because of severe erosion and moderate to steep slopes, establishing and maintaining vegetation is difficult. Generally, these soils are not suited to wildlife food plants. They are marginal for lespedeza, pine, and tickclover.

Wildlife suitability group 5

This group consists of moderately well drained or somewhat poorly drained soils. The slope range is 2 to 10 percent. The surface layer is sandy loam and sandy clay loam. The subsoil is moderately slowly to very slowly permeable, hard or plastic sandy clay to clay. These soils have medium or moderately low available moisture capacity. Tilth is good to poor. The soils are—

Helena sandy loam, 2 to 6 percent slopes, eroded.
Helena sandy loam, 6 to 10 percent slopes, eroded.
Helena sandy clay loam, 2 to 6 percent slopes, severely eroded.
Helena sandy clay loam, 6 to 10 percent slopes, severely eroded.
Iredell sandy loam, 2 to 6 percent slopes.
Vance sandy loam, 2 to 6 percent slopes, eroded.
Vance sandy loam, 6 to 10 percent slopes, eroded.

These soils are suited to a limited range of plants because roots have difficulty in penetrating the subsoil.

Wildlife suitability group 6

This group consists of well-drained to excessively drained soils that either lack a B horizon or have a thin B horizon. These soils are on the uplands. The slope range is 2 to 25 percent. The surface layer is sandy clay loam, loamy coarse sand, and sandy loam. Depth to bedrock ranges from a few inches to several feet. These soils are easily worked. The available moisture capacity is low. The erosion hazard is severe in cultivated areas. The soils are—

Louisburg complex, 6 to 10 percent slopes.
Louisburg complex, 10 to 15 percent slopes.
Louisburg stony complex, 15 to 25 percent slopes.
Wilkes complex, 2 to 6 percent slopes, eroded.
Wilkes complex, 6 to 10 percent slopes, eroded.
Wilkes complex, 10 to 15 percent slopes, eroded.
Wilkes complex, 15 to 25 percent slopes.

Because of the low available moisture capacity and the shallow root zone, these soils are marginal or poor for most plants that provide food for wildlife. They are better suited to pine and flowering dogwood than to any other wildlife food plants. Because they are shallow to bedrock, these soils are poor sites for ponds.

Wildlife suitability group 7

This group consists of deep, well-drained soils around the head of drains and on first bottoms along creeks. The first bottoms are flooded at intervals ranging from a few months to several years. Usually, the floodwater drains off in less than 2 days. The surface layer is sandy loam to silt loam. Beneath this the material varies. The available moisture capacity is low to high. These soils are easily worked. They are—

Alluvial land.
Congaree silt loam.
Local alluvial land.

Small areas of these soils are scattered throughout the county, and many areas are cultivated or used as pasture. Most of the choice wildlife food plants can be grown. Most areas can be flooded for duck fields. Sites suitable for ponds are common.

Wildlife suitability group 8

This group consists of deep, somewhat poorly drained soils on first bottoms and around the head of drains. The surface layer ranges from silt loam to sandy loam. The subsoil is variable in texture. The first bottoms are flooded for periods of 1 to 5 days almost every year. If adequately drained, these soils are easily worked. The available moisture capacity is high or medium. The soils are—

Alluvial land, moderately wet.
Chewacla silt loam.
Colfax sandy loam, 2 to 6 percent slopes.

These soils are moderately extensive in this county, and much of the acreage is in pasture or woods. Because of poor drainage, a high water table, and flooding, they are suited to only a few of the choice food plants. Browntop millet, white clover, tall fescue, Japanese millet, and smartweed can be grown. Many areas are suitable for flooding for duck fields. Water can be impounded, or ponds can be dug on these soils.

Wildlife suitability group 9

This group consists of poorly drained soils on first bottoms and in upland depressions. The surface layer is silty clay loam to sandy loam. Beneath this is gray material that ranges from sandy clay to silty clay loam and clay loam in texture. These soils are difficult to work. Because of a high water table, they have a shallow root zone. The first bottoms are flooded for periods of a few days to 2 or 3 weeks every year. The soils are—

Alluvial land, wet.
Wehadkee silty clay loam.
Worsham sandy loam, 2 to 6 percent slopes.

Because of poor drainage, a high water table, and flooding, these soils are suited to only a limited number of wildlife food plants. Japanese millet and smartweed can be grown, and also the woody plants eaten by beavers. Most areas are suitable for flooding for duck fields. Water can be impounded, or ponds can be dug.

Engineering Uses of Soils[6]

Some soil properties are of special interest to engineers because they affect the construction and maintenance of roads, airports, pipelines, building foundations, facilities for water storage, erosion-control structures, drainage systems, and sewage-disposal systems. The soil properties most important to the engineer are permeability to water, shear strength, compaction characteristics, soil drainage, shrink-swell characteristics, grain size, plasticity, and re-

[6] FELTON B. FLOURNOY, engineering specialist, Soil Conservation Service, assisted with the preparation of this section.

action (pH). Depth to water table, depth to bedrock, and topography also are important.

This report contains information about the soils of Morgan County that will be helpful to engineers. Special emphasis has been placed on engineering properties as related to agriculture, particularly those that affect irrigation, farm ponds, and structures to control and conserve soil and water.

The information in this report can be used to—

1. Make soil and land use studies that will aid in selecting and developing industrial, business, residential, and recreational sites.
2. Make preliminary estimates of the engineering properties of soils in the planning of agricultural drainage systems, farm ponds, irrigation systems, and diversion terraces.
3. Make preliminary evaluations of soil and ground conditions that will aid in selecting highway, airport, pipeline, and cable locations and in planning detailed investigations at the selected locations.
4. Locate probable sources of sand and other construction materials.
5. Correlate performance of engineering structures with soil mapping units to develop information for overall planning that will be useful in designing and maintaining certain engineering practices and structures.
6. Determine the suitability of soil mapping units for cross-country movement of vehicles and construction equipment.
7. Supplement the information obtained from other published maps and reports and aerial photographs to make maps and reports that can be used readily by engineers.
8. Develop other preliminary estimates for construction purposes pertinent to the particular area.

With the use of the soil map for identification, the engineering interpretations reported here can be useful for many purposes. It should be emphasized that they may not eliminate the need for sampling and testing at the site of specific engineering works involving heavy loads and where the excavations are deeper than the depths of layers here reported. Even in these situations, the soil map is useful for planning more detailed field investigations and for suggesting the kinds of problems that may be expected.

Engineers of the Georgia State Highway Department and the Soil Conservation Service collaborated with soil scientists of the Soil Conservation Service in preparing this part of the report. These engineers used their knowledge of soils to interpret laboratory tests and field experience.

At many construction sites there are major variations in the soils within the depth of the proposed excavation, and the soils may differ greatly within short distances. The maps, soil descriptions, and other data in this report should be used in planning detailed investigations necessary at the construction site. Then, only a minimum number of soil samples are needed for laboratory testing. After the soils have been tested and their behavior in place has been observed under varying conditions, the engineer should be able to anticipate, to some extent, the properties of individual soil units wherever they are mapped.

Information of value in planning engineering work is given throughout the text, particularly in the sections "Descriptions of Soils" and "Genesis, Morphology, and Classification of Soils."

Some terms used by soil scientists may be unfamiliar to engineers; many have special meanings in soil science. Such terms are defined in the Glossary at the back of this report.

Engineering Classification Systems

Most highway engineers classify soil materials according to the system approved by the American Association of State Highway Officials (AASHO) (*2*). In this system soil materials are classified in seven principal groups. The groups range from A–1, consisting of gravelly soils of high bearing capacity, to A–7, consisting of clayey soils having low strength when wet. Within each group, the relative engineering value of the soil material is indicated by a group index number. Group indexes range from 0 for the best materials to 20 for the poorest. In this report group index numbers are assigned only to the soils on which tests have been performed.

Some engineers prefer to use the Unified system (*13*). In this system, soil materials are identified as coarse grained (8 classes), fine grained (6 classes), or highly organic.

The engineering classifications of soil samples tested in accordance with the AASHO system and the Unified system are shown in table 12.

Engineering Test Data

Soil samples from six profiles representing two series were tested in accordance with standard procedures to help evaluate the soils for engineering purposes (table 12). Each series was sampled in three localities, and the test data from different locations show some variation in physical characteristics. The data, however, probably do not show the maximum variations in the B and C horizons. All samples were obtained at a depth of 100 inches or less. The test data, therefore, may not be adequate for estimating the characteristics of soil materials in deep cuts in areas of rolling or hilly topography. These samples were tested for moisture-density relationships, grain-size distribution, liquid limit, and plasticity index.

The results of mechanical analysis may be used to determine the relative proportions of the different size particles in the soil sample. The percentage of fine-grained material obtained by the hydrometer method, which generally is used by engineers, should not be used to determine soil textural classes.

The values for liquid limit and plasticity index indicate the effect of water on the consistence of soil material. As the moisture content of a clayey soil increases from a very dry state, the material changes from a semisolid to a plastic state. As the moisture content is further increased, the material changes from a plastic to a liquid state. The plastic limit is the moisture content at which the material passes from a semisolid to a plastic state. The liquid limit is the moisture content at which the material passes from a plastic to a liquid state. The plasticity index is the numerical difference between the liquid

limit and plastic limit. It indicates the range of moisture content within which soil material is in a plastic condition.

The two engineering classifications for each soil sample are shown in table 12. These classifications are based on the results of mechanical analysis, the liquid limit, and the plastic limit.

Soil Properties Significant in Engineering

Table 13 gives a brief description of the soils of the county. The soil material is described only to a depth of 100 inches or less. The physical properties are estimated. The estimates were based on field observations, on experience, and, to some extent, on laboratory tests. These estimates apply only to the soils of Morgan County.

As shown in table 13, all of the soils identified as one series have essentially the same profile and are fairly uniform in engineering properties in their respective horizons; for example, the profile of Appling loamy coarse sand is like that of Appling sandy clay loam except for the uppermost 6 inches. Accordingly, the engineering properties of the gullied land complexes, as compared with those of uneroded phases, depend on the amount of soil that has been removed from the original surface.

Table 13 gives USDA texture and also estimates of the engineering classification of the soils according to both the AASHO and the Unified systems. The information concerning grain size, permeability, available water capacity, reaction, dispersion, and shrink-swell potential has been generalized from laboratory tests of some of the soils and estimated for the others.

The information in the column showing depth from surface (typical profile) is based on the descriptions of typical profiles given in the section "Descriptions of Soils."

The estimates of permeability, in inches per hour, are based on soil structure and porosity and have been compared with the results of permeability tests on undisturbed cores of similar soil material. The estimates of available water capacity, in inches per inch of soil depth, are the approximate amounts of capillary water in a soil that is wet to field capacity. When the soil is air dry, this amount of water will wet it to a depth of 1 inch without deeper percolation.

The pH value indicates the degree of soil acidity (less than 7.0) or alkalinity (more than 7.0).

The ratings for shrink-swell potential indicate the volume change resulting from the shrinking of the soil when it dries and the swelling of the soil as it takes up moisture. In general, soils classified as CH and A–7 have "high" shrink-swell potential. Soils having small amounts of nonplastic to slightly plastic material have "low" shrink-swell potential.

Table 14 rates the suitability of the soils for highway construction, for conservation engineering, and for use as drainage fields for septic tanks. The ratings are based on estimates and on interpretations of estimates given in table 13 and on actual field experience and performance. Each soil is given a rating of *good*, *fair*, *poor*, or *unsuitable*, according to its suitability as a source of topsoil and road fill. If the rating is unsuitable or poor, the hazard, or adverse factor, is described. Factors affecting highway location are also listed.

There are no reliable sources of sand or natural gravel in Morgan County. Two areas included with Louisburg stony complex, 15 to 25 percent slopes, have quarries for stone that is crushed and used for road material. Small areas of poorly graded sand occur on the flood plains of several streams in the county. The largest areas are along Hard Labor Creek, near Sugar Creek.

TABLE 12.—*Engineering*

[Tests performed by State Highway Department of Georgia in cooperation with U.S. Department of Commerce, Bureau of Public as stated in footnote 2. Blanks

Soil name and location of sample	Parent material	Georgia report number S60 Ga–104—	Depth	Horizon	Moisture-density data [1]		Volume change [2]		
					Maximum dry density	Optimum moisture	Shrinkage	Swell	Total volume change
			In		*Lb. per cu. ft.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*
Appling sandy clay loam.									
0.75 mile W. of Centennial Church on Rutledge-Newborn road. (Modal)	Granite.	5–1	0–5	Ap	116	13	7. 0	2. 1	9. 1
		5–3	17 27	B22	91	29	10. 8	12. 1	22. 9
		5–6	49–72	C	89	31	12. 1	5. 5	17. 6
1 mile SW. of Highway Patrol station along Georgia State Highway No. 83. (Heavier)	Granite.	4–1	0–5	Ap	113	14	7. 3	2. 9	10. 2
		4–3	19–36	B22	106	18	9. 3	5. 0	14. 3
		4–5	50–72	C	99	21	8. 3	10. 9	19. 2
3 miles W. of Malcombs store, 0.5 mile north of Rutledge-Bostwick road. (Lighter)	Granite.	6 1	0–7	Ap	119	15	1. 0	9. 0	10. 0
		6–3	14–26	B22	101	22	7. 7	2. 5	10. 2
		6–4	26–48	C	99	22	9. 2	5. 4	14. 6
Lloyd sandy loam.									
2 miles S. of Madison on Buckhead road. (Modal)	Granite gneiss; schist intrusions.	2–1	0–7	Ap	111	13	4. 9	3. 9	8. 8
		2–4	17–32	B22	'95	26	9. 4	2. 4	11. 8
		2–6	46–70	C	98	23	11. 9	3. 8	15. 7
200 yards S. of Little Sandy Creek on State Highway No. 83. (Heavier)	Granite gneiss; schist intrusions.	1–1	0–7	Ap	118	12	3. 6	2. 0	5. 6
		1–4	27–44	B31	97	23	9. 7	8. 5	18. 2
		1–7	72–100	C2	99	20	8. 0	11. 1	19. 1
2 miles NE. county line on Newborn-Rutledge road and 0.25 mile N. of Shoal Creek. (Lighter)	Granite gneiss; schist intrusions.	3–1	0–5	Ap	117	12	2. 5	–5. 5	8. 0
		3–3	9–22	B21	100	22	11. 5	1. 9	13. 4
		3–6	40–60	C	96	23	10. 1	5. 2	15. 3

[1] Based on AASHO Designation: T 99–57, Method A (*2*).

[2] Based on "A System of Soil Classification" by W. F. Abercrombie (*1*).

[3] Mechanical analysis according to AASHO Designation: T 88 (*2*). Results by this procedure may differ somewhat from results obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method, and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analysis data used in this table are not suitable for naming textural classes for soils.

test data

Roads (BPR) in accordance with standard procedures of the American Association of State Highway Officials (AASHO) (*2*), except indicate data not determined]

Mechanical analysis [3]									Liquid limit	Plasticity index	Classification	
Percentage passing sieve—					Percentage smaller than—						AASHO	Unified [5]
¾-in.[4]	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.				
									Pct.			
100	97	90	72	46	42	35	31	27	24	6	A–4(2)	SM SC.
100	100	98	90	80	78	75	62	56	61	28	A–7–5(19)	MH.
100	100	100	70	45	41	26	12	9	51	8	A–5–(3)	SM.
100	99	96	78	49	45	40	30	28	22	5	A–4(3)	SM–SC.
100	99	97	79	58	56	53	44	37	42	[6] NP	A–5(5)	ML.
100	99	96	79	64	63	60	51	43	47	18	A–7–6(10)	ML–CL.
99	98	95	73	42	40	32	24	20	NP	NP	A–4(1)	SM.
100	100	99	86	61	60	59	50	43	42	16	A–7–6(8)	ML–CL.
100	100	97	77	60	58	55	45	36	38	3	A–4(5)	ML.
99	97	93	67	39	36	26	18	14	NP	NP	A–4(1)	SM.
100	99	96	85	72	70	68	60	52	----	----	----	----
100	99	95	78	62	59	54	46	38	----	----	----	----
99	97	91	68	35	33	27	18	14	NP	NP	A–2–4(0)	SM.
100	100	99	86	68	65	58	46	41	NP	NP	A–4(7)	ML.
100	100	100	83	62	60	52	34	28	NP	NP	A–4(5)	ML.
99	94	85	57	38	36	29	20	17	NP	NP	A–4(1)	SM.
100	99	88	71	66	65	61	55	50	46	10	A–5(7)	ML.
100	99	90	73	62	62	62	43	34	50	10	A–5(7)	ML.

[4] If the percentage passing the ¾-inch sieve is 99, the percentage passing a 1½-inch sieve would be 100.

[5] SCS and BPR have agreed to consider that all soils having plasticity indexes within two points from A-line are to be given a borderline classification. Examples of borderline classifications obtained by this use are SM–SC and ML–CL.

[6] Nonplastic.

TABLE 13.—*Brief description of soils and their*

Map symbol	Soil	Description of soil and site	Depth from surface (typical profile)	Classification	
				USDA texture	Unified
			In.		
Alm	Alluvial land.	Well-drained to wet, mixed alluvium on nearly level flood plains; commonly underlain by stratified layers of silt, clay, and sand of recent deposition. Depth to bedrock is 5 to 15 feet. Depth to seasonally high water table is 0 to 2 feet.	0 to 36	Sandy loam to silty clay loam.	SM, ML, CL.
Alp	Alluvial land, moderately wet.				
Avp	Alluvial land, wet.				
Ala	Altavista sandy loam, 0 to 2 percent slopes.	Moderately well drained soils that developed in old alluvium on low stream terraces; 7 inches of very friable sandy loam underlain by friable sandy clay loam. Beneath this is mottled sandy clay. Depth to bedrock is less than 20 feet. Depth to seasonally high water table is about 3 feet.	0 to 7	Sandy loam	SM
			7 to 29	Sandy clay loam	SC, CL
Alb	Altavista sandy loam, 2 to 6 percent slopes.		29 to 50+	Sandy clay	SC, CL
AzB2	Appling loamy coarse sand, 2 to 6 percent slopes, eroded.	Well-drained soils on uplands; 6 inches of very friable loamy coarse sand over several inches of friable sandy clay loam; underlain by firm, mottled clay to sandy clay; strong to moderate, subangular blocky structure. Below a depth of 42 inches is massive sandy clay loam residuum from such acidic rocks as granite, gneiss, and schist. Depth to bedrock is 5 to 25 feet. Depth to seasonally high water table is more than 10 feet.	0 to 6	Loamy coarse sand.	SM
			6 to 18	Sandy clay loam	SC
AzB	Appling loamy coarse sand, 2 to 6 percent slopes.		18 to 42	Clay to sandy clay.	CL, ML, MH.
AzC2	Appling loamy coarse sand, 6 to 10 percent slopes, eroded.		42 to 70	Sandy clay loam	SM, ML
AnB3	Appling sandy clay loam, 2 to 6 percent slopes, severely eroded.	Severely eroded, well-drained soils on uplands; friable to firm, sandy clay loam underlain by firm, mottled clay to sandy clay; strong to moderate, subangular blocky structure. Below a depth of 30 inches is massive sandy clay loam residuum from such rocks as granite, gneiss, and schist. Depth to bedrock is 5 to 25 feet. Depth to seasonally high water table is more than 10 ft.	0 to 5	Sandy clay loam	SM, SC
			5 to 12	Sandy clay loam	SC
AnC3	Appling sandy clay loam, 6 to 10 percent slopes, severely eroded.		12 to 30	Clay to sandy clay.	CL, ML, MH.
			30 to 64	Sandy clay loam	SM, ML
CYB	Cecil sandy loam, 2 to 6 percent slopes.	Deep, well-drained upland soils with red clayey subsoil; 8 inches of very friable sandy loam underlain by firm clay loam to clay; moderate, subangular blocky structure. Below a depth of about 40 inches is sandy clay loam residuum from such acidic rocks as granite, gneiss, and schist. Depth to bedrock is 3 to 30 feet. Depth to seasonally high water table is about 15 feet.	0 to 8	Sandy loam	SM
			8 to 40	Clay loam to clay.	CL or CH
CYB2	Cecil sandy loam, 2 to 6 percent slopes, eroded.		40 to 60	Sandy clay loam	SC, CL
CYC2	Cecil sandy loam, 6 to 10 percent slopes, eroded.				
CYD2	Cecil sandy loam, 10 to 15 percent slopes, eroded.				
CYE2	Cecil sandy loam, 15 to 25 percent slopes, eroded.				
CZB3	Cecil sandy clay loam, 2 to 6 percent slopes, severely eroded.	Severely eroded and gullied, deep, well-drained upland soils with red clayey subsoil; 6 inches of friable to firm sandy clay loam to clay underlain by firm clay loam to clay; moderate, subangular blocky structure. Below a depth of about 32 inches is sandy clay loam residuum from such acidic rocks as granite, gneiss, and schist. Depth to bedrock is 3 to 30 feet. Depth to seasonally high water table is about 15 feet.	0 to 6	Sandy clay loam to clay.	SC
			6 to 32	Clay loam to clay.	CL, ML
CZC3	Cecil sandy clay loam, 6 to 10 percent slopes, severely eroded.		32 to 50	Sandy clay loam	SC, CL
CZD3	Cecil sandy clay loam, 10 to 15 percent slopes, severely eroded.				
CZE3	Cecil sandy clay loam, 15 to 25 percent slopes, severely eroded.				
CZB4	Cecil-Gullied land complex, 2 to 6 percent slopes.				
CZC4	Cecil-Gullied land complex, 6 to 10 percent slopes.				
CZD4	Cecil-Gullied land complex, 10 to 15 percent slopes.				

estimated physical and chemical properties

Classification—Continued	Percentage passing sieve—			Permeability	Available moisture capacity	Reaction	Shrink-swell potential
AASHO	No. 4	No. 10	No. 200				
				In. per hr.	*In. per in. of depth*	*pH*	
A–2, A–4 to A–7	95 to 100	95 to 100	20 to 80	0.63 to 6.3	0. 14	5.1 to 5.5	Low to moderate.
A–2, A–4	95 to 100	90 to 100	20 to 40	2.0 to 6.3	0. 12	5.1 to 5.5	Low.
A–6	95 to 100	95 to 100	45 to 65	0.63 to 2.0	0. 13	5.1 to 5.5	Moderate.
A–6	95 to 100	95 to 100	45 to 65	0.63 to 2.0	0. 11	5.1 to 5.5	Moderate.
A–2	97 to 99	90 to 96	10 to 20	>6.3	0. 08	5.1 to 5.5	Low.
A–4, A–6	97 to 99	90 to 96	40 to 50	0.2 to 2.0	0. 12	5.1 to 5.5	Moderate.
A–5, A–6, A–7	99 to 100	97 to 100	60 to 80	0.2 to 2.0	0. 12	5.1 to 5.5	Moderate to high.
A–4, A–5, A–7	97 to 100	90 to 96	40 to 50	0.2 to 2.0	0. 13	5.1 to 5.5	Moderate.
A–4	97 to 99	90 to 96	40 to 50	0.2 to 2.0	0. 12	5.1 to 5.5	Moderate.
A–4	97 to 99	90 to 96	40 to 50	0.2 to 2.0	0. 12	5.1 to 5.5	Moderate.
A–5, A–6, A–7	99 to 100	97 to 100	60 to 80	0.2 to 2.0	0. 12	5.1 to 5.5	Moderate to high.
A–4, A–5, A–7	97 to 100	90 to 96	40 to 50	0.2 to 2.0	0. 13	5.1 to 5.5	Moderate.
A–2, A–4	95 to 100	95 to 100	20 to 40	>6. 3	0. 12	5. 1 to 5. 5	Low.
A–6, A–7	95 to 100	95 to 100	50 to 75	0. 63 to 2. 0	0. 13	5. 1 to 5. 5	Moderate to high.
A–6	95 to 100	95 to 100	45 to 65	0. 63 to 2. 0	0. 13	5. 1 to 5. 5	Moderate.
A–2, A–4	95 to 100	95 to 100	30 to 50	0. 63 to 2. 0	0. 13	5. 1 to 5. 5	Moderate to low.
A–4, A–6	95 to 100	95 to 100	50 to 75	0. 63 to 2. 0	0. 13	5. 1 to 5. 5	Moderate.
A–6	95 to 100	95 to 100	45 to 65	0. 63 to 2. 0	0. 13	5. 1 to 5. 5	Moderate to low.

TABLE 13.—*Brief description of soils and their*

Map symbol	Soil	Description of soil and site	Depth from surface (typical profile)	Classification	
				USDA texture	Unified
			In.		
Csl	Chewacla silt loam.	Deep, somewhat poorly drained or moderately well drained soil developing in recent alluvium on flood plains; 7 inches of friable silt loam underlain by friable silty clay loam that is mottled at a depth of 12 to 30 inches. Beneath this is gray silty clay loam, which in places is below the water table. Depth to bedrock is more than 10 feet. Depth to seasonally high water table is 0 to 2 feet.	0 to 7 7 to 33 33 to 50+	Silt loam Silty clay loam Silty clay loam	ML ML to MH ML to MH
CtB	Colfax sandy loam, 2 to 6 percent slopes.	Deep, somewhat poorly drained soil on uplands, in slight depressions around head of drains, and on toe slopes; 6 inches of very friable sandy loam underlain by friable sandy clay loam; weak to moderate, blocky structure; mottled in the lower half; below about 28 inches is friable, mottled clay loam over gray clayey material and pockets of sandy material. Depth to bedrock is 4 to 18 feet. Depth to seasonally high water table is 12 to 18 inches.	0 to 6 6 to 28 28 to 40 40 to 52	Sandy loam Sandy clay loam Clay loam Sandy clay to clay.	SM SC, CL CL ML, CL, MH, CH.
Con	Congaree silt loam.	Deep, well-drained soil developing in recent alluvium on flood plains; 18 inches of friable silt loam underlain by friable silty clay loam. Depth to bedrock is more than 10 feet. Depth to seasonally high water table is about 30 to 36 inches.	0 to 18 18 to 48+	Silt loam Silty clay loam	ML CL
DgB2	Davidson loam, 2 to 6 percent slopes, eroded.	Deep, well-drained, dark-red soils on uplands; developed in residuum derived from dark-colored basic rocks, such as diorite, hornblende, schist, and gabbro; 7 inches of friable to firm loam underlain by a thick layer of firm clay; moderate, subangular blocky structure; small black manganese concretions, increasing in number with depth. Depth to bedrock is more than 15 feet. Depth to seasonally high water table is more than 15 feet.	0 to 7 7 to 72 72 to 96	Loam Clay Clay loam	SM, CL CL, MH, CH. MH, CL
DhB3 DhC3 DhD3	Davidson clay loam, 2 to 6 percent slopes, severely eroded. Davidson clay loam, 6 to 10 percent slopes, severely eroded. Davidson clay loam, 10 to 15 percent slopes, severely eroded.	Severely eroded, deep, well-drained, dark-red soils on uplands; developed in residuum derived from dark-colored basic rocks such as diorite, hornblende, schist, and gabbro; 5 inches of friable to firm clay loam underlain by a thick layer of firm clay; moderate, subangular blocky structure. Depth to bedrock is more than 15 feet. Depth to seasonally high water table is more than 15 feet.	0 to 5 5 to 65 65 to 80	Clay loam Clay Clay loam	SC, SM, CL, ML. CL, MH, CH. MH, CL
Gul	Gullied land.	Gullied areas too variable in characteristics to be rated.			
HYB2 HYC2	Helena sandy loam, 2 to 6 percent slopes, eroded. Helena sandy loam, 6 to 10 percent slopes, eroded.	Somewhat poorly drained or moderately well drained upland soils; firm, clayey subsoil; 6 inches of very friable sandy loam underlain by mottled sandy clay to clay; strong, angular blocky structure; hard when dry and plastic when wet. Below a depth of about 42 inches is mottled sandy clay loam residuum derived from granite, gneiss, or aplitic granite cut with intrusions of basic rocks. Depth to bedrock is 5 to 15 feet. Depth to seasonally high water table is about 3 feet.	0 to 6 6 to 37 37 to 42	Sandy loam Sandy clay to clay. Sandy clay loam	SM CL, MH, CH. CL, CH

estimated physical and chemical properties—Continued

Classification—Continued	Percentage passing sieve—			Permeability	Available moisture capacity	Reaction	Shrink-swell potential
AASHO	No. 4	No. 10	No. 200	*In. per hr.*	*In. per in. of depth*	*pH*	
A–4, A–5	95 to 100	95 to 100	55 to 80	0.63 to 2.0	0.15	5.1 to 5.5	Low.
A–6, A–7	90 to 100	85 to 100	55 to 80	0.63 to 2.0	0.15	5.1 to 5.5	Moderate.
A–6, A–7	90 to 100	85 to 100	55 to 80	0.63 to 2.0	0.14	5.1 to 5.5	Moderate.
A–2, A–4	95 to 100	90 to 100	20 to 40	2.0 to 6.3	0.11	5.1 to 5.5	Low.
A–6, A–7	95 to 100	95 to 100	45 to 75	0.2 to 2.0	0.11	4.5 to 5.0	Moderate.
A–6	95 to 100	95 to 100	50 to 75	<0.63	0.11	4.5 to 5.5	Moderate.
A–6, A–7	95 to 100	95 to 100	50 to 70	<0.63	0.12	4.5 to 5.5	Moderate to high.
A–4	95 to 100	95 to 100	55 to 80	0.63 to 6.3	0.16	5.1 to 5.5	Low.
A–6	95 to 100	95 to 100	55 to 75	0.63 to 2.0	0.15	5.1 to 5.5	Moderate.
A–4	95 to 100	95 to 100	35 to 55	2.0 to 6.3	0.12	5.6 to 6.0	Low to moderate.
A–6, A–7	95 to 100	95 to 100	60 to 70	0.63 to 2.0	0.12	5.1 to 6.0	Moderate to high.
A–6, A–7	95 to 100	95 to 100	50 to 70	0.63 to 2.0	0.14	5.1 to 5.6	Moderate.
A–6, A–7	95 to 100	95 to 100	40 to 60	0.63 to 2.0	0.12	5.1 to 6.0	Moderate.
A–6, A–7	95 to 100	95 to 100	60 to 70	0.63 to 2.0	0.12	5.1 to 6.0	Moderate to high.
A–6, A–7	95 to 100	95 to 100	50 to 70	0.63 to 2.0	0.14	5.1 to 5.6	Moderate.
A–2, A–4	95 to 100	95 to 100	25 to 50	2.0 to 6.3	0.10	5.1 to 5.5	Low.
A–7	95 to 100	95 to 100	50 to 70	0.2 to 0.63	0.13	5.1 to 5.5	Moderate to high.
A–6 to A–7	95 to 100	95 to 100	50 to 65	0.2 to 2.0	0.12	4.5 to 5.5	Moderate to high.

TABLE 13.—*Brief description of soils and their*

Map symbol	Soil	Description of soil and site	Depth from surface (typical profile)	Classification	
				USDA texture	Unified
			In.		
HZB3	Helena sandy clay loam, 2 to 6 percent slopes, severely eroded.	Severely eroded, somewhat poorly drained or moderately well drained upland soils; firm, clayey subsoil; 6 inches of sandy clay loam underlain by mottled sandy clay to clay; strong, angular blocky structure; hard when dry and plastic when wet. Below a depth of about 30 inches is mottled sandy clay loam residuum derived from granite, gneiss, or aplitic granite cut with intrusions of basic rocks. Depth to bedrock is 5 to 15 feet. Depth to seasonally high water table is about 3 feet.	0 to 6	Sandy clay loam	SM, ML
			6 to 30	Sandy clay to clay.	ML, CL, MH, CH.
HZC3	Helena sandy clay loam, 6 to 10 percent slopes, severely eroded.		30 to 36	Sandy clay loam	CL, CH
IbB	Iredell sandy loam, 2 to 6 percent slopes.	Moderately well drained or somewhat poorly drained upland soil; very slowly permeable, highly plastic, clayey subsoil; 7 inches of friable sandy loam underlain by very plastic clay; strong, angular blocky structure. Beneath this is clayey, partially weathered material from basic rocks, such as diorite and gabbro. Depth to bedrock is 3 to 6 feet. Seasonally high water table is at the surface.	0 to 7	Sandy loam	SM
			7 to 21	Clay	CH
			21 to 38+	Clay	CH
LdB2	Lloyd sandy loam, 2 to 6 percent slopes, eroded.	Deep, well-drained upland soils; 6 inches of very friable sandy loam underlain by firm clay; moderate, subangular blocky structure. Beneath this is clay loam that is partly weathered material from basic and acidic rocks. Depth to bedrock is more than 15 feet. Depth to seasonally high water table is more than 15 feet.	0 to 6	Sandy loam	SM
LdC2	Lloyd sandy loam, 6 to 10 percent slopes, eroded.		6 to 44	Clay	ML, CL, MH.
LdD2	Lloyd sandy loam, 10 to 15 percent slopes, eroded.		44 to 60+	Clay loam	ML, CL
LeB3	Lloyd clay loam, 2 to 6 percent slopes, severely eroded.	Severely eroded and gullied, deep, well-drained upland soils; 6 inches of friable to firm clay loam to clay underlain by firm clay. Beneath this is clay loam that is partly weathered material from basic and acidic rocks. Depth to bedrock is more than 15 feet. Depth to seasonally high water table is more than 15 feet.	0 to 6	Clay loam to clay.	SM, ML
LeC3	Lloyd clay loam, 6 to 10 percent slopes, severely eroded.		6 to 38	Clay	ML, CL, MH.
LeD3	Lloyd clay loam, 10 to 15 percent slopes, severely eroded.		38 to 54+	Clay loam	ML, CL
LeE3	Lloyd clay loam, 15 to 25 percent slopes, severely eroded.				
LeC4	Lloyd-Gullied land complex, 6 to 10 percent slopes.				
LeD4	Lloyd-Gullied land complex, 10 to 15 percent slopes.				
Lcm	Local alluvial land.	About 25 to 40 inches of deep, well-drained, recent alluvium washed from nearby uplands; sandy loam to loam over layers in which textures vary. This land type overlies upland soils.	0 to 40	Sandy loam to loam.	SM
LrD	Louisburg complex, 10 to 15 percent slopes.	Somewhat excessively drained soils on uplands; 9 inches of loose loamy coarse sand underlain by friable coarse sandy loam; weak, granular structure. Beneath this is loamy coarse sand residuum derived from coarse-grained granite and other acidic rocks. Depth to bedrock is 1 to 6 feet. Depth to seasonally high water table is more than 15 feet.	0 to 9	Loamy coarse sand.	SM
LrC	Louisburg complex, 6 to 10 percent slopes.		9 to 15	Coarse sandy clay loam.	SC, CL, ML.
LmE	Louisburg stony complex, 15 to 25 percent slopes.		15 to 40	Loamy coarse sand.	SM

estimated physical and chemical properties—Continued

Classification - Continued	Percentage passing sieve—			Permeability	Available moisture capacity	Reaction	Shrink-swell potential
AASHO	No. 4	No. 10	No. 200				
				In. per hr.	*In. per in. of depth*	*pH*	
A–4, A–6	95 to 100	95 to 100	40 to 60	0.2 to 2.0	0. 12	5.1 to 5.5	Moderate.
A–6, A–7	95 to 100	95 to 100	50 to 70	0.2 to 0.63	0. 13	5.1 to 5.5	Moderate to high.
A–6 to A–7	95 to 100	95 to 100	50 to 65	0.2 to 2.0	0. 12	4.5 to 5.5	Moderate.
A–2, A–4	95 to 100	95 to 100	25 to 50	2.0 to 6.3	0. 15	5.1 to 5.5	Low.
A–7	100	95 to 100	95 to 100	<0.2	0. 15	5.1 to 5.5	Very high.
A–7	100	95 to 100	95 to 100	<0.63	0. 15	5.1 to 5.5	High.
A–2, A–4	95 to 100	95 to 100	20 to 40	2.0 to 6.3	0. 11	5.1 to 5.5	Low.
A–4, A–5, A–7	95 to 100	95 to 100	50 to 75	0.63 to 2.0	0. 11	5.1 to 5.5	Moderate.
A–4, A–5, A–6	95 to 100	95 to 100	50 to 70	0.63 to 2.0	0. 11	5.1 to 5.5	Moderate.
A–4, A–5, A–6	95 to 100	95 to 100	40 to 60	0.63 to 2.0	0. 11	5.1 to 5.5	Moderate.
A–4, A–5, A–7	95 to 100	95 to 100	50 to 75	0.63 to 2.0	0. 11	5.1 to 5.5	Moderate.
A–4, A–5, A–6	95 to 100	95 to 100	50 to 70	0.63 to 2.0	0. 11	5.1 to 5.5	Moderate.
A–2, A–4	95 to 100	95 to 100	25 to 50	2. 0 to 6. 3	0. 14	5. 5 to 6. 0	Low to moderate.
A–2	95 to 100	90 to 100	15 to 35	>6. 3	0. 05	5. 1 to 5. 5	Low.
A–4, A–6	95 to 100	95 to 100	40 to 65	2. 0 to 6. 3	0. 075	5. 1 to 5. 5	Low to moderate.
A–2	95 to 100	90 to 100	15 to 35	>6. 3	0. 05	5. 1 to 5. 5	Low.

TABLE 13.—*Brief description of soils and their*

Map symbol	Soil	Description of soil and site	Depth from surface (typical profile)	Classification	
				USDA texture	Unified
			In.		
VaB2	Vance sandy loam, 2 to 6 percent slopes, eroded.	Moderately well drained upland soils; 6 inches of very friable sandy loam underlain by very firm clay; strong, angular blocky structure. Beneath this is clayey residuum derived from granite and gneiss cut by dikes of basic rock. Depth to bedrock is 5 to 12 feet. Depth to seasonally high water table is about 10 feet.	0 to 6	Sandy loam	SM
			6 to 33	Clay	CH, MH
VaC2	Vance sandy loam, 6 to 10 per- slopes, eroded.		33 to 42+	Clay	CH, MH
Wen	Wehadkee silty clay loam.	Poorly drained soil developing in recent alluvium on flood plains; 6 inches of friable, mottled silty clay loam underlain by plastic, mottled silty clay loam to sandy clay. Beneath this is mottled, plastic clay. Depth to bedrock is about 10 feet. Seasonally high water table is at the surface.	0 to 6	Silty clay loam	CL, ML
			6 to 36+	Silty clay loam to sandy clay.	CL, CH
WgB2	Wickham fine sandy loam, 2 to 6 percent slopes, eroded.	Deep, well-drained soil that developed from old alluvium on stream terraces; 10 inches of very friable fine sandy loam underlain by friable to firm sandy clay loam; weak to moderate, subangular blocky structure; mottled in the lower part. Depth to alluvium is about 52 inches. Depth to bedrock is 20 feet or more. Depth to seasonally high water table is more than 15 feet.	0 to 10	Fine sandy loam.	SM, SC
			10 to 52	Sandy clay loam.	SC, CL
			52 to 60+	Sandy loam	SM
WhC3	Wickham clay loam, 6 to 10 percent slopes, severely eroded.	Severely eroded, deep, well-drained soil developed from old alluvium on stream terraces; 5 inches of firm clay loam underlain by friable to firm sandy clay loam; weak to moderate, subangular blocky structure; mottled in the lower part. Depth to alluvium is about 46 inches. Depth to bedrock is 20 feet or more. Depth to seasonally high water table is more than 15 feet.	0 to 5	Clay loam	ML, CL
			5 to 46	Sandy clay loam.	SC, CL, MH.
			46 to 60+	Sandy loam	SM
WpB2	Wilkes complex, 2 to 6 percent slopes, eroded.	Well-drained to excessively drained upland soils; 3 inches of very friable sandy loam underlain by sandy loam mixed with partially weathered, mixed acidic and basic rocks. Depth to bedrock is 2 to 15 feet. Depth to seasonally high water table is more than 10 feet.	0 to 3	Sandy loam	SM, SC
WpC2	Wilkes complex, 6 to 10 percent slopes, eroded.		3 to 38	Sandy loam	SM, SC
WpD2	Wilkes complex, 10 to 15 percent slopes, eroded.				
WpE	Wilkes complex, 15 to 25 percent slopes.				
WkB	Worsham sandy loam, 2 to 6 percent slopes.	Poorly drained upland soil that developed in depressions and at head of drains; 12 inches of friable, mottled sandy loam underlain by firm and plastic, mottled sandy clay; weak to moderate, blocky structure. Beneath this is clay loam to clay that is partially weathered material derived from acid rocks. Depth to bedrock is 3 to 8 feet. Seasonally high water table is at the surface.	0 to 12	Sandy loam	SM
			12 to 40	Sandy clay	CL
			40 to 50+	Clay loam to clay.	CL, CH, MH.

estimated physical and chemical properties—Continued

Classification—Continued	Percentage passing sieve—			Permeability	Available moisture capacity	Reaction	Shrink-swell potential
AASHO	No. 4	No. 10	No. 200	*In. per hr.*	*In. per in. of depth*	*pH*	
A–2, A–4	95 to 100	95 to 100	25 to 50	2.0 to 6.3	0.10	5.1 to 5.5	Low.
A–7	95 to 100	95 to 100	60 to 70	<0.63	0.12	5.1 to 5.5	Moderate to high.
A–7	95 to 100	95 to 100	50 to 80	<0.63	0.10	5.1 to 5.5	Moderate to high.
A–4 to A–7	100	100	80 to 100	0.2 to 0.63	0.12	4.5 to 5.0	Moderate to high.
A–6, A–7	100	100	60 to 100	0.2 to 0.63	0.12	4.5 to 5.0	Moderate to high.
A–2 to A–5	95 to 100	85 to 95	30 to 50	2.0 to 6.3	0.14	5.1 to 5.5	Low.
A–5, A–6	95 to 100	90 to 100	45 to 75	0.63 to 2.0	0.14	5.1 to 5.5	Moderate.
A–2 to A–4	90 to 100	70 to 90	20 to 40	2.0 to 6.3	0.14	4.5 to 5.0	Low.
A–4, A–5	95 to 100	95 to 100	50 to 80	0.63 to 2.0	0.14	5.1 to 5.5	Moderate.
A–4, A–5	95 to 100	90 to 100	45 to 75	0.63 to 2.0	0.14	5.1 to 5.5	Moderate.
A–2 or A–4	90 to 100	70 to 100	20 to 40	2.0 to 6.3	0.14	4.5 to 5.0	Low.
A–2, A–4	85 to 95	70 to 85	20 to 50	2.0 to 6.3	0.05	5.1 to 5.5	Low.
A–2, A–4, A–6	85 to 95	70 to 85	20 to 50	<0.63 to 6.3	0.05	5.1 to 5.5	Low.
A–2, A–4	95 to 100	90 to 100	20 to 40	2.0 to 6.3	0.07	4.5 to 5.5	Low.
A–6 or A–7	95 to 100	95 to 100	50 to 65	<0.63	0.10	4.5 to 5.0	Moderate to high.
A–7	95 to 100	95 to 100	60 to 80	0.2 to 2.0	0.12	4.5 to 5.0	Moderate to high.

TABLE 14.—*Engineering*

Soil series and map symbols	Suitability as source of—		Soil features affecting—		
	Topsoil [1]	Road fill	Highway location	Farm ponds	
				Reservoir area	Embankment
Alluvial land (Alm).	Fair to varying depths.	Fair; wet part of the year.	Subject to occasional flooding; seasonally high water table.	Moderate permeability.	Variable texture; low strength and stability.
Alluvial land, moderately wet (Alp). Alluvial land, wet (Avp).	Poor to fair; the wetter part is inaccessible part of the year.	Poor; usually wet.	High water table; subject to flooding.	Moderate to slow permeability.	Excess moisture; variable texture.
Altavista (AlA, AlB).	Fair	Fair	Seasonally high water table; drainage required in depressions.	Moderate permeability; slow seepage.	Only local limiting factors.
Appling (AzB, AzB2, AzC2, AnB3, AnC3).	Fair in areas not severely eroded.	Fair	Seepage at toe of slopes.	Moderate permeability; slow seepage.	Only local limiting factors.
Cecil (CYB, CYB2, CYC2, CYD2, CYE2, CZB3, CZB4, CZC3, CZC4, CZD3, CZD4, CZE3).	Fair in areas not severely eroded.	Fair	Generally no adverse soil features, except that slopes erode easily on deep cuts.	Moderate permeability; slow seepage.	Only local limiting factors.
Chewacla (Csl).	Good to depth of 7 inches.	Poor to fair; plastic subsoil.	Seasonally high water table; subject to frequent flooding; drainage required.	Moderate to slow permeability; slow seepage.	Wet part of time
Colfax (ClB).	Fair	Poor	Seasonally high water table; seepage.	Slow permeability	High water table; too wet to be compacted.
Congaree (Con).	Good to depth of 30 inches.	Fair	Subject to occasional flooding; drainage required in depressions.	Generally no adverse soil features.	Poorly graded material.
Davidson (DgB2, DhB3, DhC3, DhD3).	Fair	Poor; high shrink-swell potential.	Plastic clayey subsoil; high shrink-swell potential.	Slow seepage	High shrink-swell potential; cracks when dry; can be used as core wall; moderate to low strength and stability.
Gullied land (Gul).[2]					
Helena (HYB2, HYC2, HZB3, HZC3).	Fair	Poor; plastic subsoil.	Plastic subsoil	Generally no adverse soil features.	Moderate to high shrink-swell potential; can be used for core wall.

See footnotes at end of table.

interpretations

Soil features affecting—Continued				Limitations for sewage disposal
Agricultural drainage	Irrigation	Terraces	Waterways	
Subject to occasional flooding; seasonally high water table.	Generally no adverse features.	Not needed; level or nearly level topography.	Not applicable	Severe; seasonally high water table; occasional flooding.
High water table; frequent flooding.	Not needed	Not needed; level or nearly level topography.	Not applicable	Severe; high water table; frequent flooding.
Some areas are depressions; outlets are commonly at a distance.	Medium available moisture capacity.	Soil features favorable	Highly erodible	Severe; seasonally high water table; some areas subject to infrequent flooding.
Not needed	Medium available moisture capacity; slow intake on severely eroded areas.	Severe erosion hazard on slopes stronger than 10 percent and in severely eroded areas.	Erodible on steeper slopes.	Moderate; percolation rate 45 to 75 minutes per inch.
Not needed	Medium available moisture capacity; slow intake on severely eroded areas.	Severe erosion hazard on slopes of more than 10 percent and in severely eroded areas.	Erodible on steeper slopes.	Moderate; percolation rate 45 to 75 minutes per inch.
Seasonally high water table; subsurface drainage feasible with adequate outlets; subject to flooding.	Generally not needed	Not needed	Not applicable	Severe; high water table; subject to flooding.
Slow permeability; subsurface drainage difficult; unsuitable outlets.	Poor agricultural soil; slow intake.	Normally not needed	Difficult to establish vegetation.	Severe; seasonally high water table; somewhat poorly drained.
Well drained; occasionally flooded.	Generally no adverse soil features.	Not needed	Not applicable	Severe; seasonally high water table 2½ to 3 feet from surface; subject to flooding.
Not needed	Slow infiltration where surface soil is clayey.	Soil features normally favorable on slopes of less than 10 percent; steeper slopes not suitable.	Erodible on steeper slopes.	Slight.
Slow permeability	Slow infiltration	Shallow over clayey material.	Erodible on steeper slopes.	Severe; moderately slow to slow permeability and percolation.

TABLE 14.—*Engineering*

Soil series and map symbols	Suitability as source of—		Soil features affecting—		
	Topsoil [1]	Road fill	Highway location	Farm ponds	
				Reservoir area	Embankment
Iredell (IbB).	Fair	Poor; plastic clayey subsoil; very high shrink-swell potential.	Highly plastic material; very high shrink-swell potential; drainage required.	Generally no adverse soil features.	Very high shrink-swell potential; low strength an stability.
Lloyd (LdB2, LdC2, LdD2, LeB3, LeC3, LeC4, LeD3, LeD4, LeE3).	Fair	Poor	Slopes easily eroded in deep cuts.	Slow seepage	Moderate shrink-swell potential.
Local alluvial land (Lcm).	Good to depth of 15 to 30 inches.	Fair	Seasonally high water table in places.	Generally moderate permeability.	Variable
Louisburg (LIC, LID, LmE).	Fair	Fair	Boulders; shallow over rock in places.	Seepage excessivei n places.	Variable locally
Vance (VaB2, VaC2).	Fair	Poor; plastic subsoil.	Seepage at toe of slopes.	Slow seepage	Moderate shrink-swell potential; can be used for core wall.
Wehadkee (Weh).	Fair; generally inaccessible.	Poor; plastic subsoil and high water table.	High water table; subject to flooding; plastic soil material.	No adverse soil features.	High shrink-swell potential; cracks when dry; wet much of time.
Wickham (WgB2, WhC3).	Fair	Fair	Generally no adverse soil features, except that slopes erode in deep cuts.	Moderate permeability.	Only local limiting factors.
Wilkes (WpB2, WpC2, WpD2, WpE).	Poor; shallow to variable material.	Poor; shallow to bedrock.	Shallow depth to bedrock in places; variable soil material.	Excessive seepage through weathered rock.	Variable
Worsham (WkB).	Poor	Poor; plastic subsoil and high water table.	High water table; drainage required.	Generally no adverse soil features.	High shrink-swell potential.

[1] Surface soil material, usually rich in organic matter, used to topdress roadbanks, parks, gardens, and lawns.

Suburban and Recreational Uses of Soils

Limitations of the soils of Morgan County for selected suburban and recreational purposes are considered in this section. In table 15 the soils are grouped according to the degree of their limitations as sites for dwellings, structures for light industry, trafficways, and recreational facilities. The nature of the limitations is also shown. In the following paragraphs each of these urban and recreational purposes is defined and the properties important in eval-

interpretations—Continued

Soil features affecting—Continued				Limitations for sewage disposal
Agricultural drainage	Irrigation	Terraces	Waterways	
Very slow permeability	Very slow infiltration	Difficult to work with standard farm equipment.	Difficult to shape with standard farm equipment.	Severe; seasonally high water table is at the surface; very slow permeability; slow percolation.
Not needed	Slow infiltration where soils are severely eroded.	No limitations on slopes of less than 10 percent.	Erodible on steeper slopes.	Slight.
Generally not needed except to remove excess surface water.	Generally no adverse soil features.	Not needed	Soil features generally favorable.	Severe; moderate permeability; some areas have seasonally high water table.
Not needed	Low productivity; low water-holding capacity.	Slopes too steep	Erodible; low available moisture capacity; difficult to establish vegetation.	Severe; bedrock near surface in some areas.
Not needed	Slow infiltration; low productivity.	Shallow over clayey material.	Erodible	Severe; slow permeability and percolation.
High water table; slow to very slow permeability; frequent flooding.	Poorly drained; seasonally high water table; not commonly irrigated.	Not needed; level or nearly level topography.	Not applicable	Severe; high water table; subject to flooding.
Not needed	Generally no adverse soil features, except in severely eroded areas.	Soil features generally favorable.	Few limitations	Moderate; percolation rate 45 to 75 minutes per inch.
Not needed	Poor agricultural soil; low available moisture capacity.	Shallow weathered rock material.	Low available moisture capacity; difficult to establish vegetation.	Severe; shallow to bedrock.
Very difficult to drain; slow permeability; seepage (lateral movement).	Poor agricultural soil; slow infiltration.	Shallow over clayey material; high water table.	Not applicable	Severe; slow permeability and percolation; high water table.

[2] Too variable to be rated. On-site investigation required.

uating the limitations of the soils for such purposes are given.

Dwellings.—Dwellings are defined as residences of three stories or less. The limitations are rated for dwellings served by public or community sewerage systems and for dwellings that require septic tank filter fields. The significant soil properties are presumptive bearing capacity, shrink-swell behavior, depth to seasonally high water table, flood hazard, slope, and depth to hard rock. Flooding is a major limiting factor. If septic tank filter fields are required, a high water table and a slow percolation rate are major limitations.

TABLE 15.—*Soil limitations for suburban*

Soils	Dwellings	
	With public or community sewerage systems	With septic tank filter fields
Group 1 Alluvial land (A m). Alluvial land, moderately wet (Alp). Alluvial land, wet (Avp). Chewacla silt loam (Csl). Congaree silt loam (Con). Wehadkee silty clay loam (Weh). Worsham sandy loam, 2 to 6 percent slopes (WkB).	Severe; frequent or very frequent flooding.	Severe; frequent or very frequent flooding.
Group 2 Altavista sandy loam, 0 to 2 percent slopes (AlA). Altavista sandy loam, 2 to 6 percent slopes (AlB).	Severe; very infrequent flooding.	Severe; very infrequent flooding; percolation rate 45 to 75 minutes per inch.
Group 3 Appling loamy coarse sand, 2 to 6 percent slopes (AzB). Appling loamy coarse sand, 2 to 6 percent slopes, eroded (AzB2).	Slight	Moderate; percolation rate 45 to 75 minutes per inch.
Group 4 Appling loamy coarse sand, 6 to 10 percent slopes, eroded (AzC2).	Slight	Moderate; percolation rate 45 to 75 minutes per inch.
Group 5 Appling sandy clay loam, 2 to 6 percent slopes, severely eroded (AnB3). Appling sandy clay loam, 6 to 10 percent slopes, severely eroded (AnC3).	Slight	Moderate; percolation rate 45 to 75 minutes per inch.
Group 6 Cecil sandy loam, 2 to 6 percent slopes (CYB). Cecil sandy loam, 2 to 6 percent slopes, eroded (CYB2). Davidson loam, 2 to 6 percent slopes, eroded (DgB2). Lloyd sandy loam, 2 to 6 percent slopes, eroded (LdB2). Wickham fine sandy loam, 2 to 6 percent slopes, eroded (WgB2).	Slight	Slight to moderate; percolation rate 45 to 75 minutes per inch.
Group 7 Cecil sandy loam, 6 to 10 percent slopes, eroded (CYC2). Lloyd sandy loam, 6 to 10 percent slopes, eroded (LdC2).	Slight	Slight to moderate; percolation rate 45 to 75 minutes per inch.
Group 8 Cecil sandy clay loam, 2 to 6 percent slopes, severely eroded (CZB3). Cecil-Gullied land complex, 2 to 6 percent slopes (CZB4). Davidson clay loam, 2 to 6 percent slopes, severely eroded (DhB3). Lloyd clay loam, 2 to 6 percent slopes, severely eroded (LeB3).	Slight	Slight to moderate; percolation rate 45 to 75 minutes per inch.
Group 9 Cecil-Gullied land complex, 6 to 10 percent slopes (CZC4). Cecil sandy clay loam, 6 to 10 percent slopes, severely eroded (CZC3). Davidson clay loam, 6 to 10 percent slopes, severely eroded (DhC3). Lloyd clay loam, 6 to 10 percent slopes, severely eroded (LeC3). Lloyd-Gullied land complex, 6 to 10 percent slopes (LeC4). Wickham clay loam, 6 to 10 percent slopes, severely eroded (WhC3).	Slight	Slight to moderate; percolation rate 46 to 75 minutes per inch.

See footnotes at end of table.

and recreational development

Recreational facilities			Structures for light industry	Trafficways
Campsites and intensive play areas	Picnic grounds	Golf fairways		
Severe; poor or very poor trafficability.[1]	Severe; poor to very poor trafficability.	Severe; poor to very poor trafficability.	Severe; high water table; high corrosion potential; frequent or very frequent flooding.	Severe; frequent or very frequent flooding.
Moderate; fair trafficability.	Moderate; fair trafficability.	Moderate; fair trafficability.	Moderate; very infrequent flooding; moderate corrosion potential.	Moderate; floods less frequent than once each year and of less than 7 days duration; fair traffic-supporting capacity.[2]
Slight	Slight	Slight; a few coarse fragments in places.	Moderate; moderate shrink-swell behavior; moderate corrosion potential.	Moderate; severe inherent erodibility; fair traffic-supporting capacity.
Moderate; 6 to 10 percent slopes.	Slight	Moderate; 6 to 10 percent slopes; few coarse fragments in places.	Moderate; 6 to 10 percent slopes; moderate shrink-swell behavior; moderate corrosion potential.	Moderate; severe inherent erodibility; fair traffic-supporting capacity.
Moderate; fair trafficability; some areas have 6 to 10 percent slopes.	Moderate; fair trafficability.	Moderate; fair trafficability; some areas have 6 to 10 percent slopes; a few coarse fragments in places.	Moderate; moderate shrink-swell behavior; some areas have 6 to 10 percent slopes; moderate corrosion potential.	Moderate; severe inherent erodibility; fair traffic-supporting capacity.
Slight	Slight	Slight; a few coarse fragments in places.	Moderate; moderate shrink-swell behavior; moderate corrosion potential.	Moderate to severe; severe inherent erodibility; fair to poor traffic-supporting capacity.
Moderate; 6 to 10 percent slopes.	Slight	Moderate; 6 to 10 percent slopes; a few coarse fragments in places.	Moderate; 6 to 10 percent slopes; moderate shrink-swell behavior; moderate corrosion potential.	Moderate; severe inherent erodibility; fair traffic-supporting capacity.
Moderate; fair trafficability.	Moderate; fair trafficability.	Moderate; fair trafficability; a few coarse fragments in places.	Moderate; moderate shrink-swell behavior; moderate corrosion potential.	Moderate to severe; severe inherent erodibility; fair to poor traffic-supporting capacity.
Moderate; 6 to 10 percent slopes; fair trafficability.	Moderate; fair trafficability.	Moderate; 6 to 10 percent slopes; fair trafficability; a few coarse fragments in places.	Moderate; 6 to 10 percent slopes; moderate shrink-swell behavior; moderate corrosion potential.	Moderate to severe; severe inherent erodibility; fair to poor traffic-supporting capacity.

TABLE 15.—*Soil limitations for suburban*

Soils	Dwellings	
	With public or community sewerage systems	With septic tank filter fields
Group 10 Cecil sandy clay loam, 10 to 15 percent slopes, severely eroded (CZD3). Cecil sandy clay loam, 15 to 25 percent slopes, severely eroded (CZE3). Cecil sandy loam, 10 to 15 percent slopes, eroded (CYD2). Cecil sandy loam, 15 to 25 percent slopes, eroded (CYE2). Cecil-Gullied land complex, 10 to 15 percent slopes (CZD4). Davidson clay loam, 10 to 15 percent slopes, severely eroded (DhD3). Lloyd sandy loam, 10 to 15 percent slopes, eroded (LdD2). Lloyd clay loam, 10 to 15 percent slopes, severely eroded (LeD3). Lloyd clay loam, 15 to 25 percent slopes, severely eroded (LeE3). Lloyd-Gullied land complex, 10 to 15 percent slopes (LeD4).	Moderate; 10 to 25 percent slopes.	Moderate; 10 to 25 percent slopes.
Group 11 Colfax sandy loam, 2 to 6 percent slopes (CiB).	Severe; water table at depth of 15 inches for 8 to 10 months of the year.	Severe; percolation rate slower than 75 minutes per inch.
Group 12 Gullied land (Gul).[3]		
Group 13 Helena sandy clay loam, 2 to 6 percent slopes, severely eroded (HZB3). Helena sandy clay loam, 6 to 10 percent slopes, severely eroded (HZC3). Helena sandy loam, 2 to 6 percent slopes, eroded (HYB2). Helena sandy loam, 6 to 10 percent slopes, eroded (HYC2). Vance sandy loam, 2 to 6 percent slopes, eroded (VaB2). Vance sandy loam, 6 to 10 percent slopes, eroded (VaC2).	Moderate; moderate to high shrink-swell behavior.	Severe; percolation rate slower than 75 minutes per inch.
Group 14 Iredell sandy loam, 2 to 6 percent slopes (IbB).	Severe; very high shrink-swell behavior.	Severe; percolation rate slower than 75 minutes per inch.
Group 15 Local alluvial land (Lcm).	Severe; covered with water infrequently for very brief periods.	Severe; covered with water infrequently for very brief periods.
Group 16 Louisburg complex, 6 to 10 percent slopes (LlC). Wilkes complex, 2 to 6 percent slopes, eroded (WpB2). Wilkes complex, 6 to 10 percent slopes, eroded (WpC2).	Moderate; depth to hard rock less than 36 inches in much of the area.	Severe; depth to hard rock less than 50 inches and less than 36 inches in much of area.
Group 17 Louisburg complex, 10 to 15 percent slopes (LlD). Louisburg stony complex, 15 to 25 percent slopes (LmE). Wilkes complex, 10 to 15 percent slopes, eroded (WpD2). Wilkes complex, 15 to 25 percent slopes (WpE).	Moderate; 10 to 25 percent slopes; depth to hard rock less than 36 inches in much of area.	Severe; depth to hard rock is less than 50 inches and less than 36 inches in much of area.

[1] Trafficability refers to the ease with which people can move about over the soil on foot, on horseback, or in small vehicles, such as golf carts.

RECREATION.—Four kinds of recreational facilities are considered: campsites, intensive play areas, picnic grounds, and golf fairways. Campsites should be suitable for tents and should provide accommodations for outdoor living for a period of at least 1 week. Little site preparation is needed. Suitability for septic tanks is not a requirement. Intensive play areas include playgrounds and also baseball diamonds, tennis courts, and other facilities for organized games. Such play areas are subject to much foot traffic and generally require a nearly level surface, good drainage, and a texture and consistence that give a firm surface. They should be free of coarse fragments and rock outcrops.

The properties important in evaluating soils for use as campsites and picnic areas are slope, trafficability (which is affected by the water table and the flood hazard), and inherent erodibility. For intensive play areas, the same factors are significant and, in addition, the depth to hard rock.

Suitability for golf fairways depends mainly on ease of foot travel; ability of the soils to withstand foot and cart traffic, especially soon after rain; and freedom from ob-

and recreational development—Continued

Recreational facilities			Structures for light industry	Trafficways
Campsites and intensive play areas	Picnic grounds	Golf fairways		
Severe; 10 to 25 percent slopes.	Moderate; 10 to 25 percent slopes.	Severe; 10 to 25 percent slopes.	Severe; 10 to 25 percent slopes.	Moderate to severe; severe inherent erodibility; fair to poor traffic-supporting capacity.
Severe; poor trafficability.	Severe; poor trafficability.	Severe; poor trafficability.	Severe; high corrosion potential.	Severe; poor traffic-supporting capacity during wet periods.
Moderate; very severe inherent erodibility; some areas have 6 to 10 percent slopes.	Moderate; very severe inherent erodibility.	Slight to moderate; moderate on slopes of 6 to 10 percent.	Moderate; moderate to high shrink-swell behavior; moderate corrosion potential; some areas have 6 to 10 percent slopes.	Severe; very severe inherent erodibility; poor traffic-supporting capacity.
Severe; poor trafficability.	Severe; poor trafficability.	Severe; poor trafficability.	Severe; low presumptive bearing value; very high shrink-swell behavior; high corrosion potential.	Severe; very severe inherent erodibility; poor traffic-supporting capacity.
Moderate; fair trafficability.	Moderate; fair trafficability.	Moderate; fair trafficability.	Severe; covered with water infrequently for very brief periods.	Moderate; covered with water infrequently for very brief periods.
Moderate; 2 to 10 percent slopes; depth to hard rock less than 36 inches in much of the area.	Slight	Severe; low productivity; some coarse fragments.	Moderate; 2 to 10 percent slopes; 20 to 30 inches to hard rock in places.	Moderate; depth to hard rock less than 36 inches in much of the area.
Severe; 10 to 25 percent slopes; some areas stony; depth to hard rock less than 36 inches in much of area.	Moderate; 10 to 25 percent slopes; some areas stony.	Severe; low productivity; some stony areas.	Severe; 10 to 25 percent slopes.	Moderate; 10 to 25 percent slopes; depth to hard rock less than 36 inches in most of the area.

[2] Traffic-supporting capacity refers to the ability of the undisturbed soil to support moving loads.
[3] Too variable to be rated.

stacles to golf-ball travel. The significant soil properties are trafficability, productivity, slope, and content of coarse fragments. No rating is made of suitability for golf-course greens, because most of these are man made.

Structures for Light Industry.—These include buildings that are used for stores, offices, and small industries, and that are no more than three stories high or that require a presumptive bearing value of no more than 6,000 pounds per square foot. It is assumed that sewage-disposal facilities are available. The properties important in evaluating soils for this use are slope, depth to the water table, flood hazard, presumptive bearing value, shrink-swell behavior, and corrosion potential.

Trafficways.—This term refers to low-cost roads and residential streets, construction of which involves limited cut and fill and limited preparation of subgrade. The properties important in evaluating the soils for such trafficways are slope, depth to hard rock, depth to the water table, flood hazard, inherent erodibility, and traffic-supporting capacity.

Genesis, Morphology, and Classification of Soils

Soil is the product of parent material, topography, time, living organisms, and climate. The nature of the soil at any given place on earth depends on the combination of these five major factors at that particular place. All five of these factors have had an effect on the genesis of every soil, but the relative importance of each factor differs from place to place. In extreme cases one factor may dominate in the formation of a soil and fix most of its properties, as is common when the parent material consists of pure quartz sand. Quartz sand is highly resistant to change, and most soils that have formed in it have faint horizons. Under certain types of vegetation, where the topography is flat and the water table is high, a distinct profile may form, even in quartz sand. Thus, the past combination of the five major factors is of first importance to the present character of every soil.

Genesis of Soils

The five factors that affect soil formation are discussed in the following paragraphs.

Parent material

Parent material is the unconsolidated mass from which soil develops. It is largely responsible for the chemical and mineralogical composition of a soil. Most soils in Morgan County formed in place from residual material, that is, material that weathered from underlying rock. Table 16 lists the kinds of rock from which the parent material of each soil series was derived.

Forty-five percent of Morgan County is underlain by acidic rocks, chiefly granite, gneiss, and schist. Soils of the Appling, Cecil, Colfax, and Louisburg series are the principal soils derived from these rocks. Mixed acidic and basic rocks, chiefly granite gneiss, diorite, hornblende gneiss, and basic schist, underlie 35 percent of the county. The soils of the Lloyd and Wilkes series are the principal soils derived from this kind of parent rock. Basic rocks, chiefly diorite, hornblende, schist, and gabbro underlie about 3 percent of the county. They were the source of parent material for Davidson and Iredell soils. About 2 percent of the county is underlain by mixed acidic and basic rocks from which soils of the Vance and Helena series were derived. These rocks are chiefly granite, gneiss, and aplitic granite cut with intrusions of basic rock. The soils of the Worsham series formed in residuum from granite and gneiss mixed wtih local alluvium.

About 12 percent of the county is occupied by soils formed in alluvium. About 2 percent of this acreage consists of soils formed in old alluvium, and 10 percent, of soils formed in young alluvium. Much of this alluvium was derived from rock in the nearby uplands, but some of it came from granitic and metamorphic rock farther north. Alluvial soils are mainly along the larger streams. Those on flood plains show little profile development and for the most part are still receiving deposition. Those on the old high terraces have been in place long enough to have distinctly developed horizons.

Topography

Topography depends largely on the kind of bedrock formations underlying the soils, on the geologic history of the area, and on dissection by streams. It influences soil formation through its effects on drainage, erosion, temperature, and plant cover.

The topography of Morgan County is a result of a long period of erosion of an old smooth plain, or peneplain. A large area consists of broad ridges and long smooth slopes. Streams have cut deep V-shaped valleys. Near streams the divides are narrow and the slopes are steep. The slope range is 0 to 25 percent. Soils on uplands where the slope is less than 15 percent are generally deeper and have more distinct horizons than soils in areas where the slope is stronger. Where the slope is 15 percent or more, geologic erosion removes the soil material almost as fast as it forms. Consequently, soils that have strong slopes—for example, soils of the Wilkes series—have a thin solum.

The highest point in the county, at Fairplay, is 795 feet above sea level. The lowest point, on the Oconee River in the southeastern corner of the county, is about 400 feet above sea level.

The differences in elevation and the many branching drains contribute to the favorable drainage of the county. Excess surface water runs into stream channels and flows away rapidly.

Time

The length of time required for the development of a mature soil depends largely on the other factors of soil formation. A mature soil is one that has easily recognized A and B horizons. Generally, a soil develops in less time in a humid, warm area where vegetation is rank than in a dry or cold area where vegetation is scant. Also, the time required for development is less if the parent material is coarse textured than if it is fine textured, other factors being equal. Soils on nearly level uplands and on old stream terraces have developed to maturity; but soils of the same age on strong slopes have had little chance to develop, because geologic erosion has removed the soil material so rapidly that the solum remains shallow. On first bottoms and in the areas of local alluvium, soil material has been in place too short a time to allow distinct horizons to develop.

Living organisms

The kinds and numbers of plants and animals that live on and in the soil are governed in large part by the climate and are affected to varying degrees by the parent material, the topography, and the age of the soil.

Each cubic foot of soil contains millions of microorganisms, insects, small plants, and small animals, which exert a continuous effect on the physical and chemical properties of the soil. Bacteria, fungi, and other microorganisms speed the weathering of rock and the decomposition of organic matter. Earthworms and other small invertebrates carry on a slow but continuous cycle of soil mixing. Soil ingested by earthworms is altered chemically.

Plants return organic matter to the soil. They also transfer elements from the subsoil to the surface by assimilating these elements into their tissue and then de-

TABLE 16.—*Relationships of soil series and great soil groups, based on parent material and drainage charact*

Parent material	Red-Yellow Podzolic soils				Reddish-Brown Lateritic soils	Planosols (argipan)	Low-Humic Gley soils	Lithosols
	Representative		With some characteristics of Reddish-Brown Lateritic soils	With some characteristics of Low-Humic Gley soils				
	Well drained	Moderately well drained	Well drained	Somewhat poorly drained or moderately well drained	Well drained	Moderately well drained or somewhat poorly drained	Poorly drained	Well drained to excessively drained
Residuum from acidic rocks, chiefly granite, gneiss, and schist.	Appling, Cecil.			Colfax				Louisburg
Residuum from granite and gneiss mixed with local alluvium.							Worsham	
Residuum from dark-colored basic rocks, chiefly diorite, hornblende, schist, and gabbro.					Davidson	Iredell		
Residuum from mixed acidic and basic rocks:								
Chiefly granite gneiss, diorite, hornblende gneiss, and basic schist.			Lloyd					Wilkes
Chiefly granite, gneiss, and aplitic granite cut with intrusions of basic rock.		Vance		Helena				
Old alluvium	Wickham	Altavista						
Recent alluvium							Wehadkee	

positing the tissue on the surface in the form of fallen fruit, leaves, or stems. Soil material and elements from the subsoil are brought to the surface when trees are uprooted.

The complex of living organisms affecting soil genesis can be drastically changed by man's activities, including clearing the forests, cultivating the soils, and introducing new plants. Except for a sharp reduction in organic-matter content and a loss of surface soil through erosion in cultivated areas, the effects of man's activities are not yet visible, and some probably will not be evident for centuries.

Climate

Climate, as a genetic factor, affects the soil physically, chemically, and biologically, primarily through the influence of precipitation and temperature. Water dissolves minerals, supports biological activity, and transports mineral and organic residues through the soil profile. The amount of water that percolates through the soil at a given point depends on rainfall, relative humidity, length of the frost-free period, soil permeability, and relief. Temperature influences the kinds and growth of organisms and the speed of physical and chemical reactions in the soil.

The climate of Morgan County is of the humid, warm-temperate, continental type characteristic of the southeastern part of the United States. The average temperatures and distribution of rainfall, by months, are indicated in table 1, p. 3. In this climate, the soils are moist much of the time from November 15 through July 31 and are moderately dry much of the time from August 1 through November 14. The surface soil is frozen to a depth of 1 to 2 inches for only a few days during the year.

The climate has not caused differences among the soils, because it is nearly uniform throughout the county. As can be expected in a climate of this type, most of the soils are highly weathered, leached, strongly acid, and low in fertility.

Morphology and Classification of Soils

The soil classification system used in the United States (*9*) consists of six categories. Beginning with the most inclusive, these categories are the order, suborder, great soil group, family, series, and type.

There are three orders (zonal, intrazonal, and azonal) and thousands of types. The suborder and family categories have never been fully developed and thus have been little used. Attention has been directed largely toward great soil groups, series, and types.

The zonal order consists of soils that have evident, genetically related horizons reflecting the predominant influence of climate and living organisms in their formation. In Morgan County the zonal order is represented by the Red-Yellow Podzolic and the Reddish-Brown Lateritic great soil groups.

The intrazonal order includes soils that have evident, genetically related horizons reflecting the dominant influence of a local factor of topography or parent material over the effects of climate and living organisms. In this county the intrazonal order is represented by the Low-Humic Gley and Planosol great soil groups.

The azonal order consists of soils that lack distinct, genetically related horizons, either because of their youth or because of the resistance of the parent material to the soil-forming process. This order is represented in Morgan County by the Alluvial soils and the Lithosols. Table 16 lists the soil series by great soil groups.

The great soil groups represented in Morgan County are discussed in the following pages. The discussion includes a detailed profile description of a representative soil of each soil series in the county.

Red-Yellow Podzolic soils

The Red-Yellow Podzolic great soil group consists of well-developed, well-drained, acid soils that have a thin organic A0 horizon and an organic-mineral A1 horizon. The A1 horizon is underlain by a light-colored, bleached A2 horizon that overlies a red, yellowish-red, or yellow, more clayey B2 horizon. The parent material is all more or less siliceous. Coarse, reticulate streaks or mottles of red, brown, and light gray are characteristic of the deep horizons where the parent material is thick (*8*). Kaolinite is the dominant clay mineral. The cation-exchange capacity is low, and the percentage of base saturation is very low.

In general, Red-Yellow Podzolic soils in Morgan County have a cation-exchange capacity of less than 20 milliequivalents per 100 grams of soil and a base saturation of between 5 and 30 percent. The subsoil has a moderate, subangular blocky structure and colors of high chroma.

All of the soils in Morgan County that fit the central concept of the Red-Yellow Podzolic group originally had a thin, dark-colored A1 horizon and a well-defined A2 horizon. Plowing and erosion have disturbed these horizons, and now the surface layer on most of the acreage consists of a mixture of material from the original A1 and A2 horizons, or a mixture of material from the original A2 and B horizons, or material predominantly from the original B horizon. In most areas that are not severely eroded, the surface layer is strongly acid, granular sandy loam to sandy clay loam. The B horizon generally contains from two to six times as much clay as the A horizon and nearly twice as much clay as the C horizon. Clay films are common to prominent in the B2 horizon. The C horizon has weaker structure than the B horizon. It is more mottled and variable in color, and generally it is more strongly acid.

Cecil and Wickham Series

Cecil soils and Wickham soils are examples of the Red-Yellow Podzolic soils that have subsoil of red hue (2.5YR or 5YR) and high chroma (6 or more). Cecil soils developed on the uplands in residuum derived chiefly from granite, gneiss, and schist. The slope range is 2 to 25 percent. Wickham soils developed in old alluvium on stream terraces. They cover 47 percent of the county. The slope range is 2 to 10 percent.

Representative profile of Cecil sandy loam, 2 to 6 percent slopes, eroded:

Ap—0 to 6 inches, dark yellowish-brown (10YR 4/4) sandy loam; moderate, medium, granular structure; very friable; many fine roots; strongly acid; abrupt, smooth boundary; 4 to 8 inches thick.

A3—6 to 8 inches, strong-brown (7.5YR 5/6) sandy loam; moderate, medium, granular structure; friable; many fine roots; strongly acid; clear, smooth boundary; 0 to 8 inches thick.

B1—8 to 12 inches, yellowish-red (5YR 5/6) sandy clay loam; weak to moderate, medium, subangular blocky structure; friable; strongly acid; clear, wavy boundary; 2 to 8 inches thick.

B21t—12 to 24 inches, red (2.5YR 4/6) clay loam; moderate, fine to medium, subangular blocky structure; firm; continuous clay films on some peds; a few coarse quartz fragments and a few fine mica flakes; strongly acid; clear, wavy boundary; 6 to 20 inches thick.

B22t—24 to 28 inches, red (2.5YR 4/6 to 4/8) clay; moderate, medium, subangular blocky structure; firm; a few discontinuous clay films on some peds; a few fine mica flakes; strongly acid; clear, wavy boundary; 9 to 18 inches thick.

B3t—28 to 40 inches, red (2.5YR 4/6) clay loam; common, fine, distinct, light yellowish-brown (10YR 6/4) and brownish-yellow (10YR 6/8) mottles; moderate, medium, subangular blocky structure; friable; thin, continuous clay films around quartz fragments; common fine mica flakes; strongly acid; clear, smooth boundary; 4 to 29 inches thick.

C—40 to 60 inches, highly weathered, red, massive, acidic rock material; reddish-brown and yellowish-brown mottles. Texture is sandy clay loam.

Representative profile of Wickham fine sandy loam, 2 to 6 percent slopes, eroded:

Ap—0 to 10 inches, brown to dark-brown (10YR 4/3) fine sandy loam; weak, fine, granular structure; very friable; many fine roots; medium acid; abrupt, smooth boundary; 6 to 11 inches thick.

B1t—10 to 15 inches, yellowish-red (5YR 4/8) fine sandy clay loam; weak, fine to medium, subangular blocky structure; friable; a few small manganese concretions and feldspar crystals; medium acid; clear, smooth boundary; 4 to 7 inches thick.

B2t—15 to 35 inches, yellowish-red (5YR 4/6–5/8) fine sandy clay loam; moderate, fine to medium, subangular blocky structure; hard, firm; a few mica flakes; a few manganese concretions and quartz fragments; strongly acid; gradual, smooth boundary; 16 to 32 inches thick.

B3t—35 to 52 inches, yellowish-red (5YR 4/8) sandy clay loam; many, coarse, prominent, strong-brown (7.5YR 5/8) mottles; weak, medium, subangular blocky structure; friable; mottles are almost equal to the matrix; many fine mica flakes; strongly acid; gradual, smooth boundary; 10 to 24 inches thick.

C—52 to 60 inches, sandy loam; massive; very friable material; many very fine mica flakes. Predominant colors are red and strong brown.

Appling Series

Appling soils are distinguished from Cecil soils and Wickham soils by a less red profile. The B horizon in the Appling profile is predominantly yellowish brown to mottled strong brown to a depth of about 32 inches. It is mottled in the lower part. The slope range of Appling soils is 2 to 10 percent.

Representative profile of Appling loamy coarse sand, 2 to 6 percent slopes, eroded:

Ap—0 to 6 inches, yellowish-brown (10YR 5/4) loamy coarse sand; moderate, fine, granular structure; very friable; strongly acid; clear, wavy boundary; 5 to 10 inches thick.

B1—6 to 12 inches, yellowish-brown (10YR 5/6 to 5/8) sandy clay loam; weak, medium, subangular blocky structure; friable; strongly acid; gradual, smooth boundary; 2 to 7 inches thick.

B21t—12 to 18 inches, yellowish-brown (10YR 5/6) sandy clay loam; few, fine, distinct, red (2.5YR 4/6) mottles; moderate, medium to coarse, subangular blocky structure; friable; a few peds have patchy clay films; strongly acid; gradual, smooth boundary; 5 to 12 inches thick.

B22t—18 to 32 inches, strong-brown (7.5YR 5/8) clay; many, medium, prominent, red (2.5YR 4/6) mottles; strong, medium to coarse, subangular blocky structure; firm; thin, continuous clay films on ped faces; strongly acid; gradual, smooth boundary; 10 to 16 inches thick.

B3t—32 to 42 inches, yellowish-red (5YR 4/8) sandy clay; many, coarse, prominent, strong-brown (7.5YR 5/8) mottles; moderate, medium, subangular blocky structure; friable; slightly cemented; a few discontinuous clay films on some peds; strongly acid; gradual, smooth boundary; 9 to 25 inches thick.

C—42 to 70 inches, yellowish-brown, reddish-yellow, red, and gray, massive material. Texture is sandy clay loam.

Altavista and Vance Series

Altavista soils and Vance soils are representative of the Red-Yellow Podzolic soils that are moderately well drained. The B horizon of Altavista soils is friable sandy clay loam, and that of Vance soils is very firm clay. Light-gray and yellowish-red mottles are common in the Altavista soils below a depth of 19 inches. Vance soils are prominently mottled with light gray and red below a depth of about 20 inches. The slope range of Altavista soils is 0 to 6 percent. The slope range of Vance soils is 2 to 10 percent.

Representative profile of Altavista sandy loam, 0 to 2 percent slopes:

Ap—0 to 7 inches, brown to dark-brown (10YR 4/3) sandy loam; weak, granular structure; very friable; many roots; a few lumps of sandy clay loam from B horizon; medium acid; abrupt, smooth boundary; 5 to 10 inches thick.

B1—7 to 14 inches, yellowish-brown (10YR 5/6) sandy clay loam; weak, fine to medium, subangular blocky structure; friable; a few fine and medium roots; strongly acid; gradual, wavy boundary; 4 to 10 inches thick.

B2t—14 to 19 inches, yellowish-brown (10YR 5/6) sandy clay loam; few, coarse, faint, brownish-yellow (10YR 6/6) mottles; weak, fine, subangular blocky structure; friable; a few root channels; a few thin clay films on some ped faces; strongly acid; gradual, smooth boundary; 8 to 12 inches thick.

B3t—19 to 29 inches, yellowish-brown (10YR 5/8) sandy clay loam; common, fine, prominent, light-gray (10YR 7/2) and yellowish-red (5YR 4/8) mottles; weak to moderate, fine, subangular blocky structure; friable; gritty feel; a few clay films on some ped faces; a few feldspar fragments; strongly acid; gradual, wavy boundary; 5 to 10 inches thick.

IIC—29 to 50 inches, light yellowish-brown (10YR 6/4) sandy clay; common, medium, prominent, light-gray (10 YR 7/2) and reddish-yellow (7.5YR 6/8) mottles; massive; friable; strongly acid.

Representative profile of Vance sandy loam, 2 to 6 percent slopes, eroded:

Ap—0 to 6 inches, yellowish-brown (10 YR 5/4) sandy loam; weak, fine, granular structure; very friable to loose; many small roots; strongly acid; clear, smooth boundary; 4 to 11 inches thick.

B2t—6 to 22 inches, strong-brown (7.5YR 5/8) clay; few, medium, prominent, red (2.5YR 5/8) mottles; strong, medium to coarse, angular blocky structure; very firm; continuous clay films on most ped faces; most roots are horizontal; strongly acid; clear, smooth boundary; 9 to 22 inches thick.

B3t—22 to 33 inches, brownish-yellow (10YR 6/8) clay; common, medium, faint and prominent, light-gray (10YR 7/1) and red (2.5YR 5/8) mottles; strong, coarse, angular blocky structure; very firm; continuous clay films on most ped faces; strongly acid; clear, wavy boundary; 5 to 16 inches thick.

C—33 to 42 inches +, fairly firm, clayey, weathered, acidic rock material; predominantly gray; some mica and feldspar. Texture is clay.

Lloyd Series

Lloyd soils are classified as Red-Yellow Podzolic soils but have some characteristics, especially low contrast in color between the horizons, of the Reddish-Brown Lateritic soils. In color, structure, and clay content, the subsoil is like that of the reddest of Red-Yellow Podzolic soils. The color is identical to that of Reddish-Brown Lateritic soils. Lloyd soils developed in residuum derived from mixed acidic and basic rocks. They cover about 31 percent of the county. The slope range is 2 to 25 percent.

Representative profile of Lloyd sandy loam, 2 to 6 percent slopes, eroded:

Ap—0 to 6 inches, reddish-brown (5YR 4/4) sandy loam; weak, fine, granular structure; very friable; many fine roots; strongly acid; clear, smooth boundary; 4 to 10 inches thick.

B1—6 to 11 inches, dark-red (2.5YR 3/6) clay loam; moderate, medium, subangular blocky structure; friable to firm; some fine roots and root channels; strongly acid; clear, smooth boundary; 4 to 17 inches thick.

B2t—11 to 37 inches, red (2.5YR 4/6) clay; moderate, medium, subangular blocky structure; firm; some angular blocky peds and root channels have continuous clay films, and other peds have patchy clay films; some very fine mica flakes; strongly acid; gradual, wavy boundary; 10 to 36 inches thick.

B3t—37 to 44 inches, red (2.5YR 4/6) clay loam; a few light-red (2.5YR 6/6) mineral discolorations; moderate, medium to coarse, subangular and angular blocky structure; friable; common fine mica flakes; a few manganese concretions; clay films on faces of some peds; strongly acid; gradual, wavy boundary; 3 to 18 inches thick.

C—44 to 60 inches, mottled, mixed basic and acidic, partly weathered rock; predominantly red (2.5YR 4/8), with reddish yellow (5YR 7/8), strong brown (7.5YR 5/6), and dark red (2.5YR 3/6); friable to firm; common fine mica flakes, some quartz feldspar and basic rock fragments; weathered material breaks down to clay loam.

Colfax and Helena Series

Colfax soils and Helena soils are Red-Yellow Podzolic soils but have some characteristics of Low-Humic Gley soils. They are somewhat poorly drained or moderately well drained. In uneroded areas they have strong contrast in color between the A1 and A2 horizons. Their B horizon is mottled predominantly with yellow, gray, and some red.

Helena soils have strong structure and clay films in the B horizon. The colors are weaker than for soils that fit the central concept of the Red-Yellow Podzolic soils. The firm and plastic sandy clay and clay of the B2t horizon is like that of the Planosols, but the textural gradation from the B2t to B3t is not so abrupt as is considered characteristic of the Planosols. The slope range is 2 to 10 percent.

Colfax soils have a firm sandy clay B2t horizon. Their slope range is 2 to 6 percent.

Representative profile of Colfax sandy loam, 2 to 6 percent slopes:

Ap—0 to 6 inches, brown (10YR 5/3) sandy loam; weak, fine, granular structure; very friable; many fine roots; strongly acid; clear, wavy boundary; 6 to 20 inches thick.

B1—6 to 15 inches, brownish-yellow (10YR 6/6) sandy clay loam; common, medium, distinct, light yellowish-brown (2.5Y 6/4) mottles; weak, fine, subangular blocky structure; friable; strongly acid; clear, smooth boundary; 3 to 9 inches thick.

B2t—15 to 28 inches, brownish-yellow (10YR 6/6) sandy clay loam; many, medium, prominent, red (2.5YR 4/8), light yellowish-brown (2.5Y 6/4), and strong-brown (7.5YR 5/6) mottles; moderate, medium, angular blocky structure; firm, hard when dry; few clay films on ped faces; strongly acid; clear, smooth boundary; 10 to 18 inches thick.

B3—28 to 40 inches, yellowish-brown (10YR 5/6) clay loam; many, coarse, prominent, red (2.5YR 5/6) and pale-olive (5Y 6/4) mottles; moderate, coarse, angular blocky structure; friable, hard when dry; mica flakes; strongly acid; gradual, smooth boundary; 10 to 14 inches thick.

C—40 to 52 inches, brownish-yellow and gray, clayey material; massive; small pockets of red sandy loam. Texture is sandy clay to clay.

Representative profile of Helena sandy loam, 2 to 6 percent slopes, eroded:

Ap—0 to 6 inches, dark grayish-brown (10YR 4/2) and brownish-yellow (10YR 6/6) sandy loam; weak to moderate, medium to fine, granular structure; very friable; many fine roots; some coarse sand grains; strongly acid; clear, smooth boundary; 3 to 12 inches thick.

B1t—6 to 8 inches, brownish-yellow (10YR 6/6) sandy clay; few, fine, faint, gray and yellowish-brown (10YR 5/8) mottles; strong, fine, angular blocky structure; firm, slightly cemented; a few patchy clay films on ped faces; strongly acid; gradual, wavy boundary; 2 to 4 inches thick.

B2t—8 to 31 inches, brownish-yellow (10YR 6/6) sandy clay to clay; common, fine to coarse, prominent, yellowish-red (5YR 5/6) and some gray mottles; strong, fine to coarse, angular blocky structure; hard, firm, and plastic; clay films on most ped faces; strongly acid; gradual, smooth boundary; 5 to 10 inches thick.

B3t—31 to 37 inches, brownish-yellow (10 YR 6/6) sandy clay; common, medium, prominent, very pale brown (10 YR 7/3–7/4) and light-gray (10YR 7/1) mottles; moderate, coarse, angular blocky structure; friable; patchy clay films on some ped faces; strongly acid; gradual, wavy boundary; 2 to 8 inches thick.

C—37 to 42 inches +, mottled yellow and gray, partially weathered, acidic rock material. Texture is sandy clay loam.

Reddish-Brown Lateritic soils

Reddish-Brown Lateritic soils have a dark reddish-brown mineral surface layer over a dark-red, clayey, illuvial B horizon. These soils lack a light-colored eluvial A2 horizon like that of the Red-Yellow Podzolic soils, and they have a redder B horizon than those soils. They developed under deciduous hardwoods in a moist, warm-temperate climate that has both wet and dry seasons.

Reddish-Brown Lateritic soils are medium or strongly acid and are low in organic-matter content. The base-exchange capacity of their subsoil is less than 20 milliequivalents per 100 grams of soil, and the base saturation is less than 30 percent.

In Morgan County, the Reddish-Brown Lateritic group is represented by Davidson soils, which fit the central concept of this great soil group. These soils formed in material weathered from basic igneous and metamorphic rock. They are distinguished from Cecil and Wickham soils chiefly by their darker red profile and lower content of rock fragments, sand, and mica. Kaolinite and vermiculite are the dominant clay minerals.

Representative profile of Davidson loam, 2 to 6 percent slopes, eroded:

Ap—0 to 7 inches, dark reddish-brown (2.5YR 3/4) loam; moderate, medium, subangular blocky structure; friable to firm; many roots; medium acid; gradual, wavy boundary; 5 to 8 inches thick.

B1—7 to 10 inches, dark reddish-brown (2.5YR 3/4) clay loam; strong, coarse, subangular blocky structure; firm; many fine roots; strongly acid; clear, wavy boundary; 0 to 15 inches thick.

B2t—10 to 47 inches, dark-red (2.5YR 3/6) clay; moderate, medium, subangular blocky structure; firm; sticky when wet; a few small, black, rounded manganese accretions; thin, discontinuous clay films in root channels; few roots; strongly acid; gradual, wavy boundary; 30 to 70 inches thick.

B3—47 to 72 inches, dark-red (2.5YR 3/6) clay; moderate, medium, subangular blocky structure; firm; manganese accretions increase with depth; a few small quartz crystals and basic rock fragments; strongly acid; diffuse, wavy boundary; 15 to 50 inches thick.

C—72 to 96 inches, highly weathered basic rock. Texture is clay loam.

Planosols

Planosols are in the intrazonal order. Their distinguishing feature is a well-defined layer of clay or cemented material at varying depths (*8*). This kind of layer develops where drainage is more or less restricted.

Iredell soils are the only Planosols in Morgan County. They have a genetic B horizon that is an argipan, or claypan. This horizon is 13 to 40 inches thick and is very plastic when wet. It has strong to medium, angular blocky structure and has thick clay films on points of angles and in root channels. Part of the clay has formed in place, and part has been leached from the A horizon. The slope range of Iredell soils is 2 to 6 percent.

Slow permeability is the outstanding limitation of the claypan soils. The clay minerals are predominantly 2:1 lattice type. The base-exchange capacity is commonly high; it ranges from 25 to 50 milliequivalents per 100 grams of soil.

Representative profile of Iredell sandy loam, 2 to 6 percent slopes:

Ap—0 to 7 inches, olive-brown (2.5Y 4/4) sandy loam; moderate, medium, granular structure; friable; many fine roots; few quartz fragments 1 to 4 inches in diameter; medium acid; clear, smooth boundary; 5 to 8 inches thick.

B21t—7 to 9 inches, dark yellowish-brown (10YR 4/4) clay; strong to medium, coarse, angular blocky structure; hard; very plastic; few small, rounded iron and manganese concretions; thin clay films in root channels; medium acid; gradual, smooth boundary; 6 to 14 inches thick.

B22t—9 to 21 inches, dark yellowish-brown (10YR 4/4) and light olive-brown (2.5Y 5/4) clay; strong, fine, angular blocky structure; tends to become prismatic when dry; very plastic, very hard when dry; few small, rounded iron and manganese concretions; thick clay films on angles of peds and in root channels; medium acid; diffuse, irregular boundary; 7 to 26 inches thick.

C—21 to 38 inches +, mixed clayey basic rock material; predominantly olive, brown, and gray. Texture is clay.

Low-Humic Gley soils

The Low-Humic Gley great soil group is in the intrazonal order. It consists of imperfectly drained or poorly drained soils that have a thin surface horizon, generally low in organic-matter content, over a mottled, gray and brown, gleylike mineral horizon that is only a little different from the surface horizon in texture (*8*).

In Morgan County, the Low-Humic Gley group is represented by Wehadkee and Worsham soils. Wehadkee soils occupy low positions on flood plains, and Worsham soils are in seepage areas in depressions and around the head of drains. The water table is at or near the surface during wet periods but is well below the surface during dry periods. Uneroded areas have a dark-colored but thin A1 horizon. The reaction is strongly acid, and the percentage of base saturation is low. The slope range of Wehadkee soils is 0 to 2 percent. The slope range of Worsham soils is 2 to 6 percent.

Representative profile of Worsham sandy loam, 2 to 6 percent slopes:

A11—0 to 4 inches, dark-brown (7.5YR 4/2–3/2) sandy loam; weak, medium, subangular structure; friable; recent alluvial material; many fine roots; strongly acid; abrupt, smooth boundary; 3 to 10 inches thick.

A12—4 to 12 inches, dark-brown (10YR 4/3) sandy loam; few, medium, distinct, yellowish-red (5YR 4/8) mottles; weak, fine, granular structure; very friable; many fine roots; strongly acid; clear, smooth boundary; 4 to 9 inches thick.

IIB1g—12 to 30 inches, light brownish-gray (2.5Y 6/2) sandy clay; many, fine, distinct, olive-brown (2.5Y 4/4) and brownish-yellow (10YR 6/6) mottles; weak, medium, subangular blocky structure; friable, slightly plastic; a few small roots; strongly acid; clear, smooth boundary; 6 to 20 inches thick.

IIB2g—30 to 36 inches, light-gray (2.5Y 7/2) sandy clay; few, medium, prominent, yellowish-brown (10YR 5/8) and yellowish-red (5YR 5/8) mottles; moderate, coarse, angular blocky structure; hard, firm, plastic; gritty feel; clay skins on most peds; strongly acid; gradual, smooth boundary; 4 to 15 inches thick.

IIB3tg—36 to 40 inches, light-gray (5Y 7/1) sandy clay loam; few, fine, distinct, olive (5Y 5/6) mottles; weak, medium, subangular blocky structure; hard, firm, plastic; clay skins on some peds; gritty feel; strongly acid; clear, smooth boundary; 3 to 8 inches thick.

IICg—40 to 50 inches +, light olive-gray (5Y 6/2), gleyed, partially weathered rock material; massive; mottle free; some angular quartz and feldspar fragments. Texture is clay loam to clay.

Representative profile of Wehadkee silty clay loam (0 to 2 percent slopes) follows:

A—0 to 6 inches, reddish-brown (5YR 4/4) silty clay loam; common, fine, faint, light-gray to gray (5YR 6/1) mottles; weak, medium and coarse, granular structure; friable, slightly plastic; medium acid; abrupt, smooth boundary; 3 to 10 inches thick.

C1g—6 to 12 inches, light-gray (N 7/0) sandy clay loam; common, fine, prominent, yellowish-brown (10YR 5/8) and some yellow and black mottles; massive; friable, plastic; strongly acid; clear, smooth boundary; 5 to 12 inches thick.

C2g—12 to 36 inches +, light-gray (N 7/0) silty clay loam; common, medium, prominent, yellowish-brown (10YR 5/6) and dark grayish-brown (10YR 4/2) mottles; massive; plastic; strongly acid; 12 to 22 inches thick.

Lithosols

Lithosols are in the azonal order. These soils differ little from one another in either profile characteristics or degree of development. Ordinarily they are shallow and occur in rough, hilly or steep areas. In many places they are stony. Commonly they are only slightly developed and lack distinct horizons, but in a few small areas the profile is fairly well developed. In many places the C horizon is exposed, and in some places bedrock is exposed. The native vegetation consists mostly of thin, open stands of hardwood trees.

In this county the soils of the Lithosol great soil group occupy some of the steeper slopes. Geologic erosion has nearly kept pace with the soil-forming processes.

Louisburg and Wilkes soils are the only Lithosols in Morgan County. Louisburg soils are shallow. They formed in residuum weathered from coarse-grained granite. Although they are classified as Lithosols, they differ from true Lithosols in that they have a discontinuous B horizon as much as 9 inches thick in some areas. They are strongly acid and low in base saturation. Their slope range is 6 to 25 percent. Wilkes soils are shallow. They formed in residuum weathered from mixed basic and acidic rocks. Their B horizon is thin and discontinuous. They are slightly to strongly acid. Their slope range is 2 to 25 percent.

Representative profile of a soil in Louisburg complex, 10 to 15 percent slopes:

Ap—0 to 5 inches, dark grayish-brown (10YR 4/2) loamy coarse sand; weak, fine to medium, granular structure; loose, very friable; many fine roots (a few are horizontal); strongly acid; clear, smooth boundary; 3 to 6 inches thick.

A2—5 to 9 inches, dark-brown to brown (7.5YR 4/4) coarse sandy loam; weak, medium, granular structure; loose, friable; some roots are horizontal and some are vertical; strongly acid; discontinuous boundary; 0 to 8 inches thick.

B—9 to 15 inches, red (2.5YR 4/6) coarse sandy clay loam; weak, medium, granular structure; friable; layer is discontinuous; some mineral discolorations; strongly acid; discontinuous boundary; 0 to 7 inches thick.

C—15 to 40 inches, partly weathered, coarse-textured, acidic rock; some mica and feldspar that is predominantly light red; a few tree roots. Texture is loamy coarse sand.

Representative profile of a soil in the Wilkes complex, 10 to 15 percent slopes, eroded:

Ap—0 to 3 inches, very dark grayish-brown (10YR 3/2) sandy loam; weak, fine to medium, granular structure; very friable; common fine roots; some quartz grains; slightly acid; abrupt, smooth boundary; 1 to 8 inches thick.

AC—3 to 7 inches, dark grayish-brown (2.5Y 4/2) to yellowish-brown (10YR 5/4 to 5/6) sandy loam mixed with decomposed basic rock; massive; friable; common fine mica flakes; strongly acid; clear, wavy boundary; 3 to 8 inches thick.

C1—7 to 22 inches, partly weathered basic rock; very friable to firm in places; common fine mica flakes; variegated colors, but predominantly strong brown (7.5YR 5/6).

C2—22 to 38 inches, partly weathered basic rock, including schist, mica, feldspar, and others; firm to friable; form and shape of original rock is visible; colors are yellow, red, brown, and some black. Texture is sandy loam.

Alluvial soils

Alluvial soils are in the azonal order. They consist of relatively recent alluvium that has been modified only slightly or not at all by soil-forming processes.

In Morgan County, Congaree soils represent the central concept of this great soil group. These soils show little profile development. They are subject to flooding but are free of excess water during periods of normal stream flow. A slightly darker color in the upper part of the profile than in the lower part indicates that organic matter has accumulated in the upper part. The clay content is high enough to impart a loam texture to the uppermost 2 or 3 feet of the profile. The slope range of Congaree soils is 0 to 2 percent.

Chewacla soils are Alluvial soils, but they have some characteristics of the Low-Humic Gley group. They are moderately well drained or somewhat poorly drained. The uppermost 12 to 30 inches is free of gleying, but the lower part has indications of at least moderate gleying. In general, the uppermost layer is slightly darker colored than that of the well-drained, associated Congaree soils. There is no clear evidence of a B horizon. The entire profile is strongly acid, and the percentage of base saturation is low. The slope range is 0 to 2 percent.

Representative profile of Congaree silt loam (0 to 2 percent slopes):

Ap—0 to 8 inches, brown to dark-brown (7.5YR 4/4) silt loam; moderate, medium, granular structure; very friable; many roots and fine pores; medium acid; abrupt, smooth boundary; 5 to 12 inches thick.

A12 –8 to 18 inches, dark-brown (7.5YR 4/4 to 3/2) silt loam; weak, fine, granular structure; friable; few fine mica flakes; many fine roots and fine pores; medium acid; abrupt, smooth boundary; 0 to 10 inches thick.

C1—18 to 24 inches, dark-brown (7.5YR 4/4) and yellowish-brown (10YR 5/4) silty clay loam; massive; friable; few fine and medium roots; many fine mica flakes; strongly acid; clear, smooth boundary; 5 to 20 inches thick.

C2—24 to 36 inches, yellowish-red (5YR 4/6) silty clay loam; massive; friable; a few pale-brown (10YR 6/3) and black splotches; common fine mica flakes; strongly acid; clear, smooth boundary; 8 to 16 inches thick.

C3—36 to 48 inches, reddish-brown (5YR 4/4) silty clay loam; common, coarse, distinct, light-brown (7.5YR 6/4) and black mottles; massive; friable; numerous mica flakes; strongly acid.

Representative profile of Chewacla silt loam (0 to 2 percent slopes):

Ap—0 to 7 inches, dark reddish-brown (5YR 3/4) silt loam; weak, medium to coarse, subangular blocky structure; friable; many fine roots and a few medium pores; medium acid; clear, smooth boundary; 5 to 10 inches thick.

C1—7 to 14 inches, reddish-brown (5YR 4/4) silty clay loam; massive; friable; a few small black specks and fine mica flakes; strongly acid; abrupt, smooth boundary; 5 to 9 inches thick.

C2—14 to 28 inches, brown to dark-brown (7.5YR 4/4) silty clay loam; many, fine and medium, distinct, light yellowish-brown (10YR 6/4) mottles; massive; friable; strongly acid; gradual, wavy boundary; 7 to 16 inches thick.

C3—28 to 33 inches, brown to dark-brown (10YR 4/3) silty clay loam; many, medium, prominent, strong-brown (7.5YR 5/6) and very dark gray (N 3/0) mottles; massive; friable; strongly acid; gradual, wavy boundary; 4 to 15 inches thick.

C4—33 to 40 inches, light olive-gray (5Y 6/2) silty clay loam; many, medium, faint, olive (5Y 4/4) and dark yellowish-brown (10YR 4/4) mottles; massive; friable; a few black concretions; strongly acid; 6 to 20 inches thick.

C5—40 to 50 inches +, gray (5Y 5/1), friable, gleyed silty clay loam material; some small, black and brown accretions.

Additional Facts About Morgan County

This section tells something about the history, population, and agriculture of the county. It also includes information about industries, transportation and markets, and community facilities.

Organization, Settlement, and Population

Morgan County was organized on December 10, 1807. It was opened for settlement, and land lots of 202½ acres each were distributed under the lottery plan. Settlement was well underway by 1810.

The first settlers came mostly from Virginia and the Carolinas. Buckhead was the first settlement. Madison, incorporated in 1809, was referred to in early writings as the most prosperous and aristocratic city on the stagecoach route from Charleston to New Orleans. Apalachee, an early trading post, was known to settlers and traders as early as 1820. High Shoals was the site of the earliest industry in the county; a yarn mill was located there for years. Other early settlements were Godfrey, Bostwick, and Rutledge. Morgan County had a population of 10,280 in 1960, and Madison, the county seat and largest town, had a population of 2,680. County boundaries are the same today as they were in 1807.

Transportation and Markets

U.S. Highway No. 278 crosses the county from east to west. U.S. Highways No. 441 and No. 129 cross from north to south through the central part of the county. A tentative survey has been made for Interstate Highway No. 20, which will cross the county from east to west. The concrete paving on State Highway No. 12, from Rutledge to Madison, is the second oldest paving in Georgia. State Highway No. 83 from Madison southwest to the Jasper County line near Pennington is paved with concrete. All other highways are paved with asphalt, or the surface is treated with bitumen. Hard-surfaced roads connect all towns and communities and serve most farms in the county.

The Georgia Railroad crosses the county from east to west. It passes through Swords, Buckhead, Madison, and Rutledge. The Central of Georgia, Macon to Athens branch, crosses the county from north to south. It passes through Apalachee, Madison, and Godfrey.

Markets for corn, grain, and cotton are available at Madison and Athens. Milk is transported from dairies in the county to processing plants in Athens, Eatonton, and Atlanta. Livestock is sold at sales barns located at Athens, Greensboro, Social Circle, and Atlanta.

Industries

Industries in Madison include a furniture factory, a lumber mill, a cordage mill, a cheese plant, a pulpwood yard, a farm cooperative, and a shirt factory. Rutledge has a garment factory and a waste-processing plant. Farm income is commonly supplemented by the wages of one or more members of the family who work in one of these industries.

About 1830 a Morgan County planter, Launcelot Johnson, invented and patented the first cottonseed huller for the manufacture of cottonseed oil. His crude invention was the forerunner of the cottonseed-oil industry in the United States.

Community Facilities

There are elementary schools in Madison, Godfrey, Bostwick, Buckhead, Springfield, and Rutledge, and there are two high schools in Madison. Schoolbuses furnish transportation. The University of Georgia is within commuting distance of all parts of the county. There are churches in the rural communities of Bethany, Brownwood, Sandy Creek, Centennial, and Pennington, and several churches in all of the urban communities. Two newspapers are published in the county, and there is one radio station.

Hard Labor Creek State Park, which is near Rutledge in the western part of the county, has facilities for camping, swimming, picnicking, and fishing.

Natural gas is supplied to Madison. Bottled gas is available for farm homes, and most farms are equipped with electricity and running water.

Agriculture

Morgan County was part of the territory obtained by the State in 1802, after a treaty with Creek Indians. Most of the area was in forest at that time. The Indians, a nomadic people who lived mostly by hunting and fishing, had made only scattered clearings.

Early farming in the county was mostly self-sustaining. Corn, oats, wheat, and barley were the main crops. A few cows, hogs, and sheep were raised. As settlement proceeded, markets developed. Cotton gradually increased in acreage. After the close of the Civil War, it became the most important crop, and it continued to increase in acreage until the infestation of boll weevils in 1921.

The high price of cotton immediately after World War I had brought on a land boom. The better farms were selling for as much as $75 and $100 per acre. A light infestation of boll weevils in 1916 and 1917 had reduced yields, but the 1919 cotton crop was the largest since 1911 and the price was at an all-time high. In 1920, large amounts of fertilizer were used. Cotton yielded 36,197 bales on 76,041 acres—almost a half bale per acre—and the price fell to about half the 1919 price. The next year the boll weevil reappeared, and in spite of extensive use of poison, there was almost a complete crop failure. Yields of 1 bale to 15 acres were reported on some farms. The dominance of cotton in the economy ended, and dairying began to increase in importance.

Davidson and Lloyd soils, which produced cotton plants that had large leaves under which the boll weevil thrived, were the first soils to be converted to dairy farming. In 1954 Morgan County ranked first in the State in number of milk cows and second in whole milk sales. In 1959, almost 4 million gallons of whole milk was sold, and more than 41 percent of the total farm income was derived from dairy products. The number of livestock in stated years is shown in table 17.

Approximately 57 percent of the acreage in the county is now in woodland. The original upland forests were

TABLE 17.—*Number of livestock in stated years*

Livestock	1939	1950	1959
All cows 2 years old or more	[1] 3, 196	6, 815	10, 276
Milk cows	2, 701	5, 306	7, 941
Horses and mules	[1] 2, 704	1, 386	381

[1] Figure for year 1940.

chiefly hardwoods—red oak, black oak, post oak, white oak, Spanish oak, hickory, and some chestnut. Blackgum, sweetgum, poplar, willow, alder, and some white oak grew along the flood plains. By 1920 about 86 percent of the county had been cleared. Part of this has reverted to forest. The present woodland consists mainly of second-growth loblolly and shortleaf pines. Much of the farm income is from forest products. The forests are protected by the Morgan-Walton County Fire Protection Unit in cooperation with the Georgia Forestry Commission.

There are several commercial peach orchards in the county (see table 18), and in 1959 the sale of fruit and nuts accounted for 5 percent of all farm income. There has been a constant decline in cropland and an increase in pasture and woodland. The expenditure for fertilizers has increased. In 1959 there were 3,066 tons of fertilizer used for cotton and 2,525 tons for pasture and hay.

TABLE 18.—*Acreage of principal crops and number of nut and fruit trees in stated years*

Crop	1939	1949	1959
Corn—acres	24, 465	9, 547	5, 658
Cotton—acres	20, 790	26, 650	10, 315
Oats—acres	6, 966	3, 876	2, 686
Hay crops—acres	7, 773	8, 624	7, 825
Pecan trees—number	4, 018	[1] 5, 327	3, 101
Peach trees—number	76, 980	[1] 68, 180	80, 953

[1] Figure is for the year 1950.

The Sugar Creek Drainage District was established and dredging and straightening of most of Sugar and Little Sugar Creeks were completed during the early twenties. For the most part the main channels are still clear, and where laterals have been maintained, the flood plain is being drained fairly well. About 40 percent of the flood plain is used for pasture. The uplands of the watershed have not been completely protected from erosion, and the channel is filling up in places.

There is about 9,000 acres, mostly on the flood plains of Indian, Hard Labor, and Sandy Creeks, that if drained would be highly productive cropland and pasture. These acreages are now in capability unit IIIw–2.

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Glossary

Aggregate, soil. Many fine particles held in a single mass or cluster, such as a clod, crumb, block, or prism.

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Available moisture capacity. The relative capacity of a soil to store water in a form available to plants.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Clay. As a soil separate, mineral soil particles that are less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt. (See also Texture, soil.)

Colluvium. Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent; will not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard and brittle; little affected by moistening.

Corrosion potential, soil. The tendency of a soil to corrode iron pipe buried in the soil. Ratings in this report are moderate or high.

Erosion. The wearing away of the land surface by wind, running water, and other geological agents.

Fertility, soil. The quality of a soil that enables it to provide compounds, in adequate amounts and in proper balance, for the growth of specified plants, when other growth factors, such as light, moisture, temperature, and the physical condition (or tilth) of the soil, are favorable.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flood plain. Nearly level land, consisting of stream sediments, that borders a stream and is subject to flooding unless protected artificially.

Friable. See Consistence, soil.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes.

Igneous rock. Rock that has been formed by the cooling of molten mineral material. Examples: Granite, syenite, diorite, and gabbro.

Loam. See Texture, soil.

Metamorphic rock. Rocks of any origin that have been completely changed physically by heat, pressure, and movement. Such rocks are nearly always crystalline.

Mottled. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are as follows: Abundance—*few*, *common*, and *many;* size—*fine*, *medium*, and *coarse*; and contrast—*faint*, *distinct*, and *prominent*. The size measurements are these: *fine*, less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium*, ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse*, more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Natural drainage. The conditions that existed during the development of the soil, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven different classes of natural drainage are recognized.

Excessively drained soils are commonly very porous and rapidly permeable and have a low water-holding capacity.

Somewhat excessively drained soils are also very permeable and are free from mottling throughout their profile.

Well-drained soils are nearly free from mottling and are commonly of intermediate texture.

Moderately well drained soils commonly have a slowly permeable layer in or immediately beneath the solum. They have uniform color in the A and upper B horizons and have mottling in the lower B and C horizons.

Imperfectly or somewhat poorly drained soils are wet for significant periods; in podzolic soils there commonly is mottling below a depth of 6 to 16 inches, in the lower part of the A horizon and in the B and C horizons.

Poorly drained soils are wet for long periods and are light gray and generally mottled from the surface downward, although mottling may be absent or nearly so in some soils.

Very poorly drained soils are wet nearly all the time. They have a dark-gray or black surface layer and are gray or light gray, with or without mottling, in the deeper parts of the profile.

Permeability, soil. The quality that enables water or air to move through the soil. Terms used to describe permeability are as follows: *very slow, slow, moderately slow, moderate, moderately rapid, rapid,* and *very rapid.*

Plow layer. The soil ordinarily moved in tillage; equivalent to surface soil.

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. An acid, or "sour," soil is one that gives an acid reaction; an alkaline soil is one that is alkaline in reaction. In words, the degrees of acidity and alkalinity are expressed thus:

	pH		*pH*
Extremely acid	below 4.5	Mildly alkaline	7.4 to 7.8
Very strongly acid	4.5 to 5.0	Moderately alkaline	7.9 to 8.4
Strongly acid	5.1 to 5.5	Strongly alkaline	8.5 to 9.0
Medium acid	5.6 to 6.0	Very strongly alkaline	9.1 and higher
Slightly acid	6.1 to 6.5		
Neutral	6.6 to 7.3		

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum. Unconsolidated, partly weathered mineral material that accumulates over disintegrating solid rock. Residual material is not soil but is frequently the material in which a soil has formed.

Rock, acidic. Rock composed dominantly of light-colored minerals, such as quartz and orthoclase feldspar.

Rock, basic. Dark-colored rock, generally low in silica and rich in metallic bases.

Sand. Individual rock or mineral fragments 0.05 to 2.0 millimeters in diameter. Most sand grains consist of quartz, but they may be of any mineral composition. The textural class name of any soil that is 85 percent or more sand and not more than 10 percent clay. (See also Texture, soil.)

Silt. Individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). Soil of the silt textural class is 80 percent or more silt and less than 12 percent clay. (See also Texture, soil.)

Soil. A natural, three-dimensional body on the earth's surface that supports plants and that has properties resulting from the integrated effect of climate and living matter acting upon parent material, as conditioned by relief, over periods of time.

Soil separates. Mineral particles, less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows: *Very coarse sand* (2.0 to 1.0 millimeter); *coarse sand* (1.0 to 0.5 millimeter); *medium sand* (0.5 to 0.25 millimeter); *fine sand* (0.25 to 0.10 millimeter); *very fine sand* (0.10 to 0.05 millimeter); *silt* (0.05 to 0.002 millimeter); and *clay* (less than 0.002 millimeter).

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in a mature soil includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristic of the soil are largely confined to the solum.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are (1) *single grain* (each grain by itself, as in dune sand) or (2) *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the profile below plow depth.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil; about 5 to 8 inches in thickness. The plowed layer.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea. Stream terraces are frequently called second bottoms, as contrasted to flood plain, and are seldom subject to overflow. Marine terraces were deposited by the sea and are generally wide.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Tilth, soil. The condition of the soil in relation to the growth of plants, especially soil structure. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable, granular structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Traffic-supporting capacity. The ability of the undisturbed soil to support moving loads; indicates the desirability of a soil for use as subgrade material.

Trafficability. The ease with which people can move about and over the soil on foot, on horseback, or in small vehicles, such as golf carts. Soil properties that affect trafficability significantly are depth to water table, flood hazard, coarse fragments on the surface, and texture of the surface layer. Slope is not considered in evaluating the soils for trafficability, because the trafficways may be on the contour.

Upland (geologic). Land consisting of material unworked by water in recent geologic time and lying, in general, at a higher elevation than the alluvial plain or stream terrace. Land above the lowlands along rivers.

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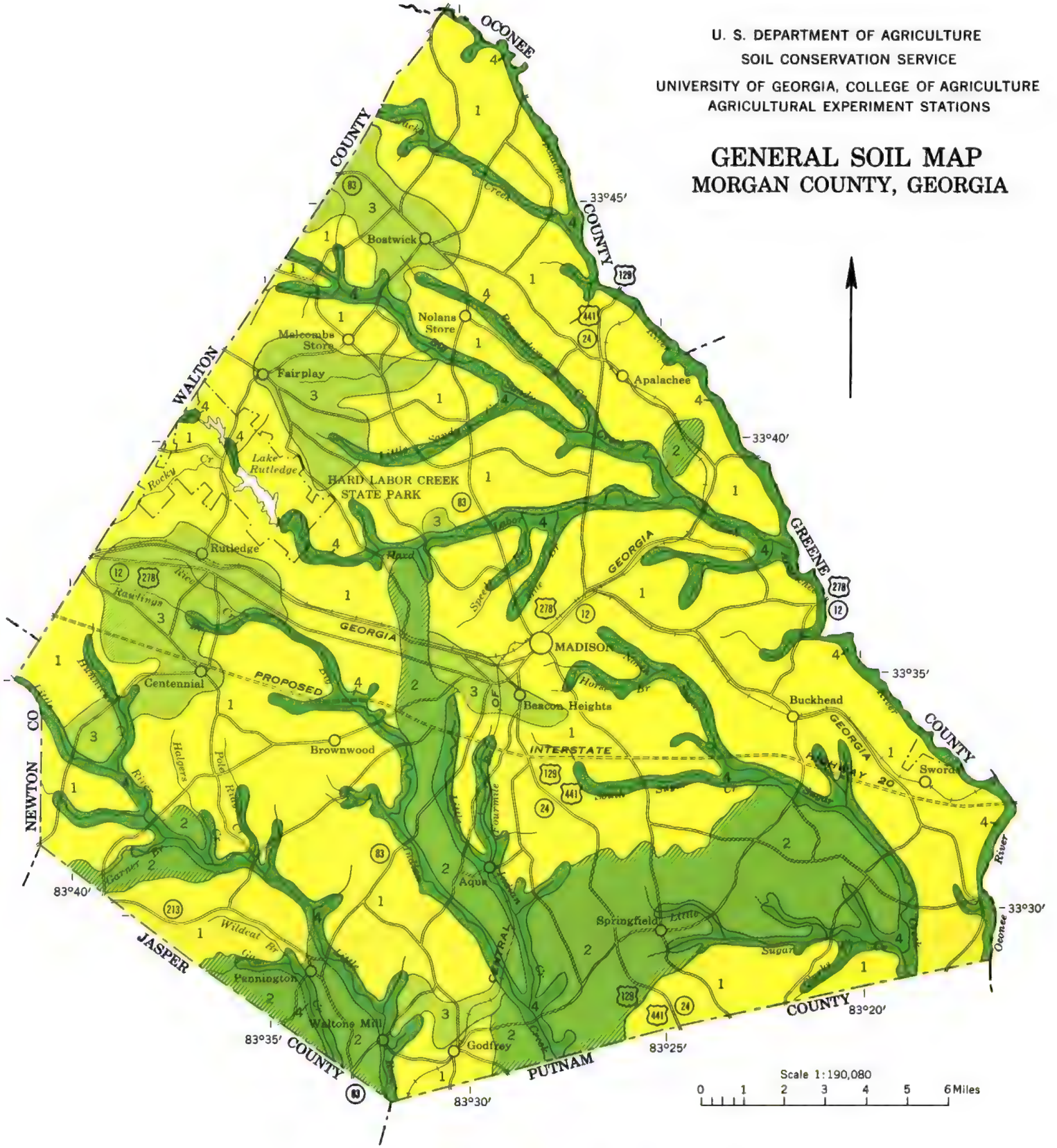
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
UNIVERSITY OF GEORGIA, COLLEGE OF AGRICULTURE
AGRICULTURAL EXPERIMENT STATIONS

GENERAL SOIL MAP
MORGAN COUNTY, GEORGIA



SOIL ASSOCIATIONS

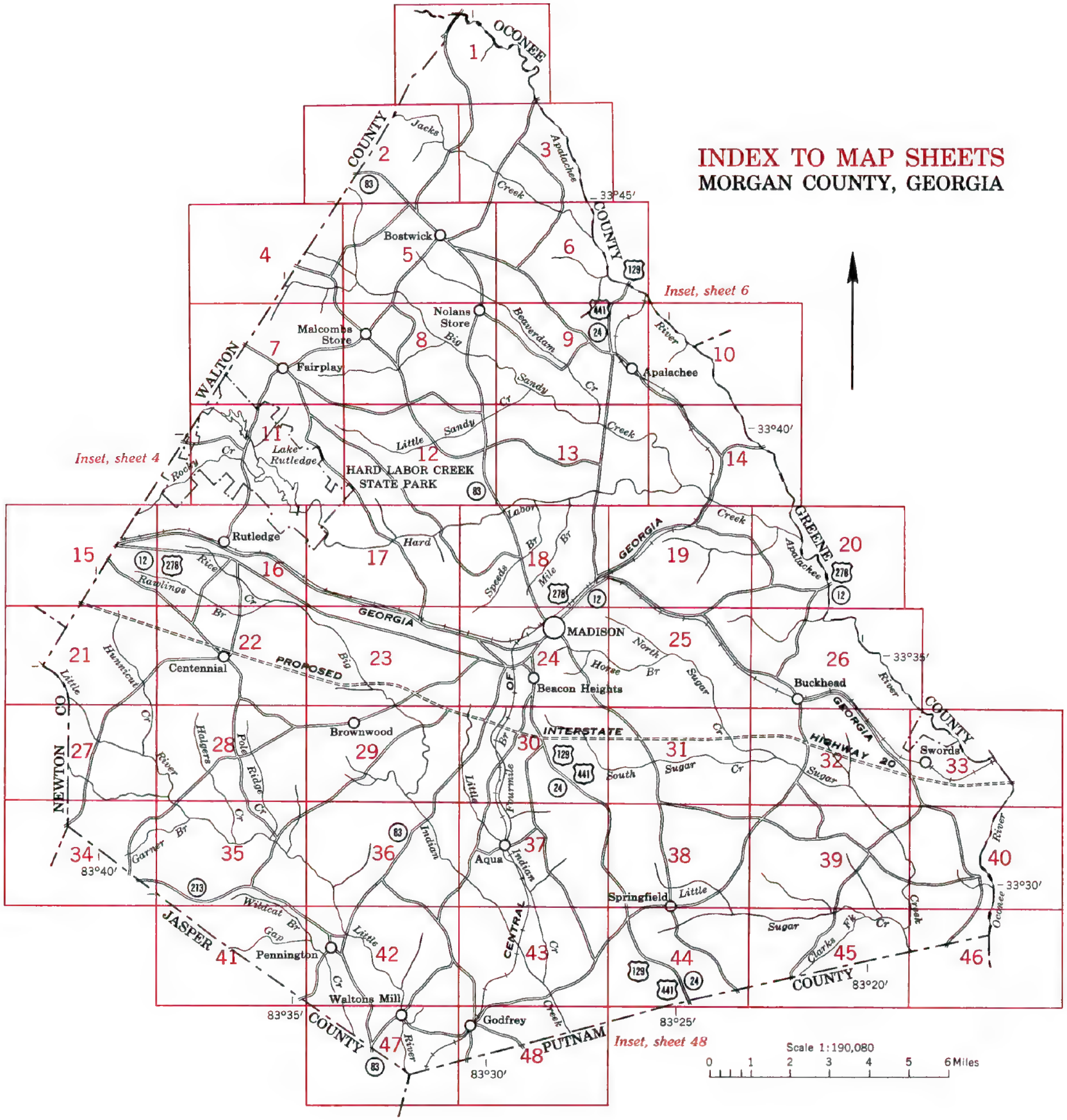
1 — Cecil-Lloyd association: Soils with clayey and chiefly red subsoil

2 — Lloyd-Davidson association: Soils with dark-red to red clayey subsoil

3 — Appling-Cecil association: Soils with yellowish-brown to red clayey subsoil, mottled in the lower part in some places

4 — Alluvial land-Chewacla association: Poorly drained to moderately well drained soils on flood plains, subject to overflow

April 1965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MORGAN COUNTY, GEORGIA
OCONEE COUNTY
WALTON COUNTY
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JASPER COUNTY
PUTNAM COUNTY
GREENE COUNTY
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Lake Rutledge
Bostwick
Nolans Store
Malcomba Store
Fairplay
Apalachee
Rutledge
MADISON
Beacon Heights
Centennial
Brownwood
Buckhead
Swords
Aqua
Springfield
Pennington
Waltons Mill
Godfrey
GEORGIA HIGHWAY 20
PROPOSED INTERSTATE
CENTRAL OF GEORGIA
Jacks Creek
Apalachee River
Beaverdam Creek
Big Sandy Cr
Little Sandy Creek
Rocky Cr
Hard Labor Creek
Rice Cr
Rawlings Br
Speeds Br
Three Mile Creek
Apalachee River
Little Hunnicutt Cr
Big Horse Cr
North Br Sugar Cr
South Fk Sugar Cr
Sugar Creek
Halgers Pole Ridge Cr
Little Fourmile Cr
Indian Cr
Garner Br
Wildcat Br Gap
Little Cr
Clarks Fk Cr
Oconee River
83°45′
83°40′
83°35′
83°30′
83°25′
83°20′
33°45′
33°40′
33°35′
33°30′
Scale 1:190,080
0 1 2 3 4 5 6 Miles

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

MORGAN COUNTY, GEORGIA

UNIVERSITY OF GEORGIA, COLLEGE OF AGRICULTURE,
AGRICULTURAL EXPERIMENT STATIONS

SOIL LEGEND

The first letter in each symbol is the initial of the soil name. If the third letter is a capital, it shows the range of slope from A, less than 2 percent, to E, more than 25 percent. A number after the slope letter denotes the class of erosion as given in the soil name.

SYMBOL	NAME
Alm	Alluvial land
Alp	Alluvial land, moderately wet
AlA	Altavista sandy loam, 0 to 2 percent slopes
AlB	Altavista sandy loam, 2 to 6 percent slopes
AnB3	Appling sandy clay loam, 2 to 6 percent slopes, severely eroded
AnC3	Appling sandy clay loam, 6 to 10 percent slopes, severely eroded
AvP	Alluvial land, wet
AzB	Appling loamy coarse sand, 2 to 6 percent slopes
AzB2	Appling loamy coarse sand, 2 to 6 percent slopes, eroded
AzC2	Appling loamy coarse sand, 6 to 10 percent slopes, eroded
CfB	Colfax sandy loam, 2 to 6 percent slopes
Con	Congaree silt loam
Csl	Chewacla silt loam
CYB	Cecil sandy loam, 2 to 6 percent slopes
CYB2	Cecil sandy loam, 2 to 6 percent slopes, eroded
CYC2	Cecil sandy loam, 6 to 10 percent slopes, eroded
CYD2	Cecil sandy loam, 10 to 15 percent slopes, eroded
CYE2	Cecil sandy loam, 15 to 25 percent slopes, eroded
CZB3	Cecil sandy clay loam, 2 to 6 percent slopes, severely eroded
CZC3	Cecil sandy clay loam, 6 to 10 percent slopes, severely eroded
CZD3	Cecil sandy clay loam, 10 to 15 percent slopes, severely eroded
CZE3	Cecil sandy clay loam, 15 to 25 percent slopes, severely eroded
CZB4	Cecil-Gullied land complex, 2 to 6 percent slopes
CZC4	Cecil-Gullied land complex, 6 to 10 percent slopes
CZD4	Cecil-Gullied land complex, 10 to 15 percent slopes
DgB2	Davidson loam, 2 to 6 percent slopes, eroded
DhB3	Davidson clay loam, 2 to 6 percent slopes, severely eroded
DhC3	Davidson clay loam, 6 to 10 percent slopes, severely eroded
DhD3	Davidson clay loam, 10 to 15 percent slopes, severely eroded
Gul	Gullied land
HYB2	Helena sandy loam, 2 to 6 percent slopes, eroded
HYC2	Helena sandy loam, 6 to 10 percent slopes, eroded
HZB3	Helena sandy clay loam, 2 to 6 percent slopes, severely eroded
HZC3	Helena sandy clay loam, 6 to 10 percent slopes, severely eroded
IbB	Iredell sandy loam, 2 to 6 percent slopes
Lcm	Local alluvial land
LdB2	Lloyd sandy loam, 2 to 6 percent slopes, eroded
LdC2	Lloyd sandy loam, 6 to 10 percent slopes, eroded
LdD2	Lloyd sandy loam, 10 to 15 percent slopes, eroded
LeB3	Lloyd clay loam, 2 to 6 percent slopes, severely eroded
LeC3	Lloyd clay loam, 6 to 10 percent slopes, severely eroded
LeD3	Lloyd clay loam, 10 to 15 percent slopes, severely eroded
LeE3	Lloyd clay loam, 15 to 25 percent slopes, severely eroded
LeC4	Lloyd-Gullied land complex, 6 to 10 percent slopes
LeD4	Lloyd-Gullied land complex, 10 to 15 percent slopes
LlC	Louisburg complex, 6 to 10 percent slopes
LlD	Louisburg complex, 10 to 15 percent slopes
LmE	Louisburg stony complex, 15 to 25 percent slopes
VaB2	Vance sandy loam, 2 to 6 percent slopes, eroded
VaC2	Vance sandy loam, 6 to 10 percent slopes, eroded
Weh	Wehadkee silty clay loam
WgB2	Wickham fine sandy loam, 2 to 6 percent slopes, eroded
WhC3	Wickham clay loam, 6 to 10 percent slopes, severely eroded
WkB	Worsham sandy loam, 2 to 6 percent slopes
WpB2	Wilkes complex, 2 to 6 percent slopes, eroded
WpC2	Wilkes complex, 6 to 10 percent slopes, eroded
WpD2	Wilkes complex, 10 to 15 percent slopes, eroded
WpE	Wilkes complex, 15 to 25 percent slopes

CONVENTIONAL SIGNS

WORKS AND STRUCTURES

Highways and roads
- Dual
- Good motor
- Poor motor
- Trail

Highway markers
- National Interstate
- U. S.
- State

Railroads
- Single track
- Multiple track
- Abandoned

Bridges and crossings
- Road
- Trail, foot
- Railroad
- Ferries
- Ford
- Grade
- R. R. over
- R. R. under
- Tunnel

Buildings
- School
- Church
- Station

Mines and Quarries

Mine dump

Pits, gravel or other

Power lines

Pipe lines

Cemeteries

Dams

Levees

Tanks

Forest fire or lookout station

BOUNDARIES

- National or state
- County
- Reservation
- Land grant

DRAINAGE

Streams
- Perennial
- Intermittent, unclass.

Canals and ditches — CANAL / DITCH

Lakes and ponds
- Perennial
- Intermittent

Wells — flowing

Springs

Marsh

Wet spot

Drainage end

RELIEF

Escarpments
- Bedrock
- Other

Prominent peaks

Depressions

	Large	Small
Crossable with tillage implements		
Not crossable with tillage implements		
Contains water most of the time		

SOIL SURVEY DATA

- Soil boundary and symbol — Dx
- Gravel
- Stones
- Rock outcrops
- Chert fragments
- Clay spot
- Sand spot
- Gumbo or scabby spot
- Made land
- Severely eroded spot
- Blowout, wind erosion
- Gullies

Soil map constructed 1964 by Cartographic Division, Soil Conservation Service, USDA, from 1960 aerial photographs. Controlled mosaic based on Georgia plane coordinate system, west zone, transverse Mercator projection. 1927 North American datum.

GUIDE TO MAPPING UNITS

[See table 2, p. 7, for approximate acreage and proportionate extent of soils; table 3, p. 32, for estimated average acre yields; and table 12, p. 48, table 13, p. 54, and table 14, p. 58, for information on engineering properties of soils]

Map symbol	Mapping unit	Page	Capability unit		Woodland group		Wildlife group	
			Symbol	Page	Number	Page	Number	Page
Alm	Alluvial land	6	IIw-2	25	1	40	7	45
Alp	Alluvial land, moderately wet	7	IIIw-2	27	9	42	8	45
AlA	Altavista sandy loam, 0 to 2 percent slopes	8	I-2	22	3	41	1	44
AlB	Altavista sandy loam, 2 to 6 percent slopes	8	IIe-2	23	3	41	1	44
AnB3	Appling sandy clay loam, 2 to 6 percent slopes, severely eroded	9	IIIe-2	26	4	41	3	44
AnC3	Appling sandy clay loam, 6 to 10 percent slopes, severely eroded	9	IVe-1	28	4	41	3	44
Avp	Alluvial land, wet	7	IVw-1	29	9	42	9	45
AzB	Appling loamy coarse sand, 2 to 6 percent slopes	9	IIe-2	23	5	41	1	44
AzB2	Appling loamy coarse sand, 2 to 6 percent slopes, eroded	8	IIe-2	23	5	41	1	44
AzC2	Appling loamy coarse sand, 6 to 10 percent slopes, eroded	9	IIIe-2	26	5	41	1	44
CiB	Colfax sandy loam, 2 to 6 percent slopes	12	IIIw-3	27	6	41	8	45
Con	Congaree silt loam	12	IIw-2	25	1	40	7	45
Csl	Chewacla silt loam	12	IIIw-2	27	9	42	8	45
CYB	Cecil sandy loam, 2 to 6 percent slopes	10	IIe-1	23	2	40	1	44
CYB2	Cecil sandy loam, 2 to 6 percent slopes, eroded	9	IIe-1	23	2	40	1	44
CYC2	Cecil sandy loam, 6 to 10 percent slopes, eroded	10	IIIe-1	25	2	40	1	44
CYD2	Cecil sandy loam, 10 to 15 percent slopes, eroded	10	IVe-1	28	2	40	2	44
CYE2	Cecil sandy loam, 15 to 25 percent slopes, eroded	10	VIe-2	29	2	40	2	44
CZB3	Cecil sandy clay loam, 2 to 6 percent slopes, severely eroded	10	IIIe-1	25	4	41	3	44
CZC3	Cecil sandy clay loam, 6 to 10 percent slopes, severely eroded	10	IVe-1	28	4	41	3	44
CZD3	Cecil sandy clay loam, 10 to 15 percent slopes, severely eroded	11	VIe-2	29	4	41	4	44
CZE3	Cecil sandy clay loam, 15 to 25 percent slopes, severely eroded	11	VIIe-1	30	4	41	4	44
CZB4	Cecil-Gullied land complex, 2 to 6 percent slopes	11	IVe-1	28	4	41	4	44
CZC4	Cecil-Gullied land complex, 6 to 10 percent slopes	11	VIe-2	29	4	41	4	44
CZD4	Cecil-Gullied land complex, 10 to 15 percent slopes	11	VIIe-1	30	4	41	4	44
DgB2	Davidson loam, 2 to 6 percent slopes, eroded	13	IIe-1	23	2	40	1	44
DhB3	Davidson clay loam, 2 to 6 percent slopes, severely eroded	13	IIIe-1	25	4	41	3	44
DhC3	Davidson clay loam, 6 to 10 percent slopes, severely eroded	13	IVe-1	28	4	41	3	44
DhD3	Davidson clay loam, 10 to 15 percent slopes, severely eroded	13	IVe-1	28	4	41	4	44
Gul	Gullied land	13	VIIe-4	30	---	--	4	44
HYB2	Helena sandy loam, 2 to 6 percent slopes, eroded	14	IIe-4	24	6	41	5	45
HYC2	Helena sandy loam, 6 to 10 percent slopes, eroded	14	IVe-2	28	6	41	5	45
HZB3	Helena sandy clay loam, 2 to 6 percent slopes, severely eroded	14	IVe-2	28	7	42	5	45
HZC3	Helena sandy clay loam, 6 to 10 percent slopes, severely eroded	14	VIe-4	30	7	42	5	45
IbB	Iredell sandy loam, 2 to 6 percent slopes	15	IIe-4	24	7	42	5	45
Lcm	Local alluvial land	16	I-1	22	1	40	7	45
LdB2	Lloyd sandy loam, 2 to 6 percent slopes, eroded	15	IIe-1	23	2	40	1	44
LdC2	Lloyd sandy loam, 6 to 10 percent slopes, eroded	15	IIIe-1	25	2	40	1	44
LdD2	Lloyd sandy loam, 10 to 15 percent slopes, eroded	15	IVe-1	28	2	40	2	44
LeB3	Lloyd clay loam, 2 to 6 percent slopes, severely eroded	16	IIIe-1	25	4	41	3	44
LeC3	Lloyd clay loam, 6 to 10 percent slopes, severely eroded	16	IVe-1	28	4	41	3	44
LeD3	Lloyd clay loam, 10 to 15 percent slopes, severely eroded	16	IVe-1	28	4	41	4	44
LeE3	Lloyd clay loam, 15 to 25 percent slopes, severely eroded	16	VIe-2	29	4	41	4	44
LeC4	Lloyd-Gullied land complex, 6 to 10 percent slopes	16	VIe-2	29	4	41	4	44
LeD4	Lloyd-Gullied land complex, 10 to 15 percent slopes	16	VIe-2	29	4	41	4	44
LlC	Louisburg complex, 6 to 10 percent slopes	17	IVe-4	28	5	41	6	45
LlD	Louisburg complex, 10 to 15 percent slopes	17	VIe-3	30	5	41	6	45
LmE	Louisburg stony complex, 15 to 25 percent slopes	17	VIIe-2	30	5	41	6	45
VaB2	Vance sandy loam, 2 to 6 percent slopes, eroded	18	IIe-3	24	6	41	5	45
VaC2	Vance sandy loam, 6 to 10 percent slopes, eroded	18	IIIe-3	26	6	41	5	45
Weh	Wehadkee silty clay loam	18	IVw-1	29	9	42	9	45
WgB2	Wickham fine sandy loam, 2 to 6 percent slopes, eroded	18	IIe-1	23	3	41	1	44
WhC3	Wickham clay loam, 6 to 10 percent slopes, severely eroded	19	IVe-1	28	4	41	3	44
WkB	Worsham sandy loam, 2 to 6 percent slopes	20	Vw-1	29	9	42	9	45
WpB2	Wilkes complex, 2 to 6 percent slopes, eroded	19	IIIe-5	26	8	42	6	45
WpC2	Wilkes complex, 6 to 10 percent slopes, eroded	19	IVe-4	28	8	42	6	45
WpD2	Wilkes complex, 10 to 15 percent slopes, eroded	19	VIe-3	30	8	42	6	45
WpE	Wilkes complex, 15 to 25 percent slopes	20	VIIe-2	30	8	42	6	45

757-412 O-65 (Face blank page 76)

This map is one of a set compiled in 1964 as part of a soil Survey by the Soil Conservation Service, United States Department of Agriculture, and the University of Georgia College of Agriculture, Agricultural Experiment Stations.

0 3000 Feet

0 ½ Mile

Scale 1:15 840

1

N

OCONEE COUNTY

WALTON COUNTY

High Shoals

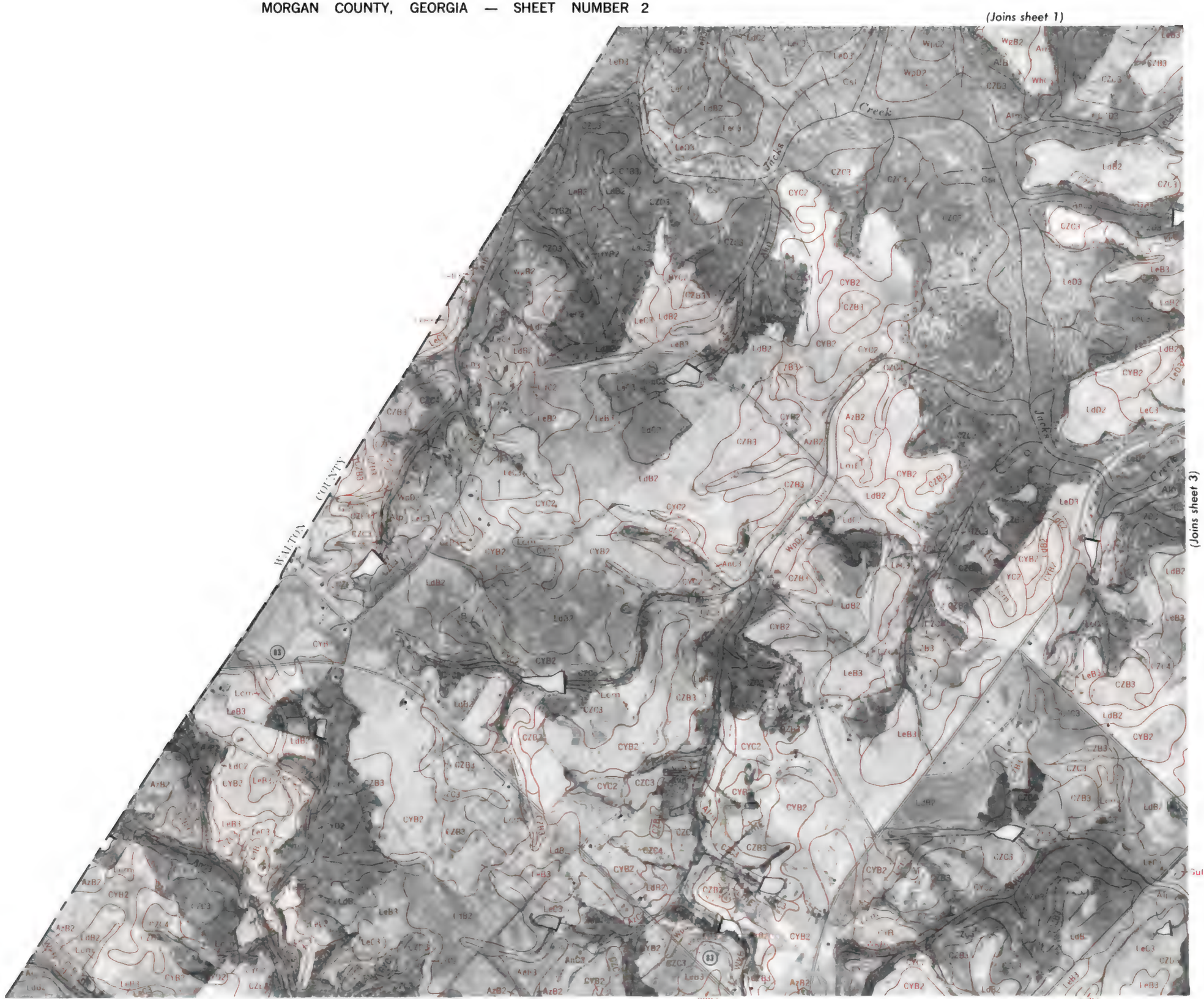
APALACHEE RIVER

(Joins sheet 2) | (Joins sheet 3)

MORGAN COUNTY, GEORGIA — SHEET NUMBER 2

(2)

N



MORGAN COUNTY, GEORGIA — SHEET NUMBER 3

(Joins sheet 1)

(Joins sheet 2)

(Joins sheet 5) | (Joins sheet 6)

3

N

Rehoboth Church

APALACHEE RIVER

OCONEE COUNTY

CREEK

Scale 1:15 840

0 ½ Mile

0 3000 Feet

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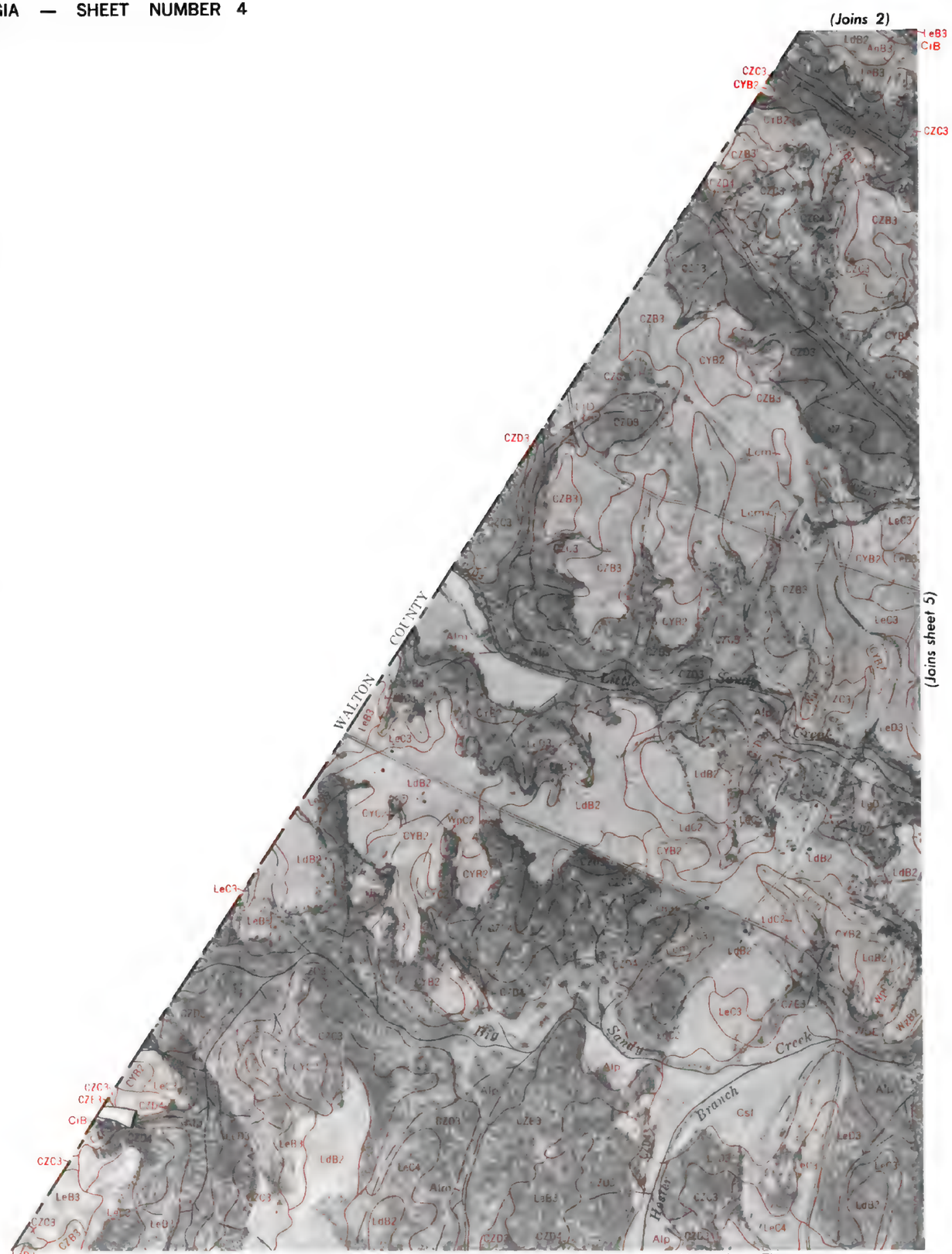
4

N



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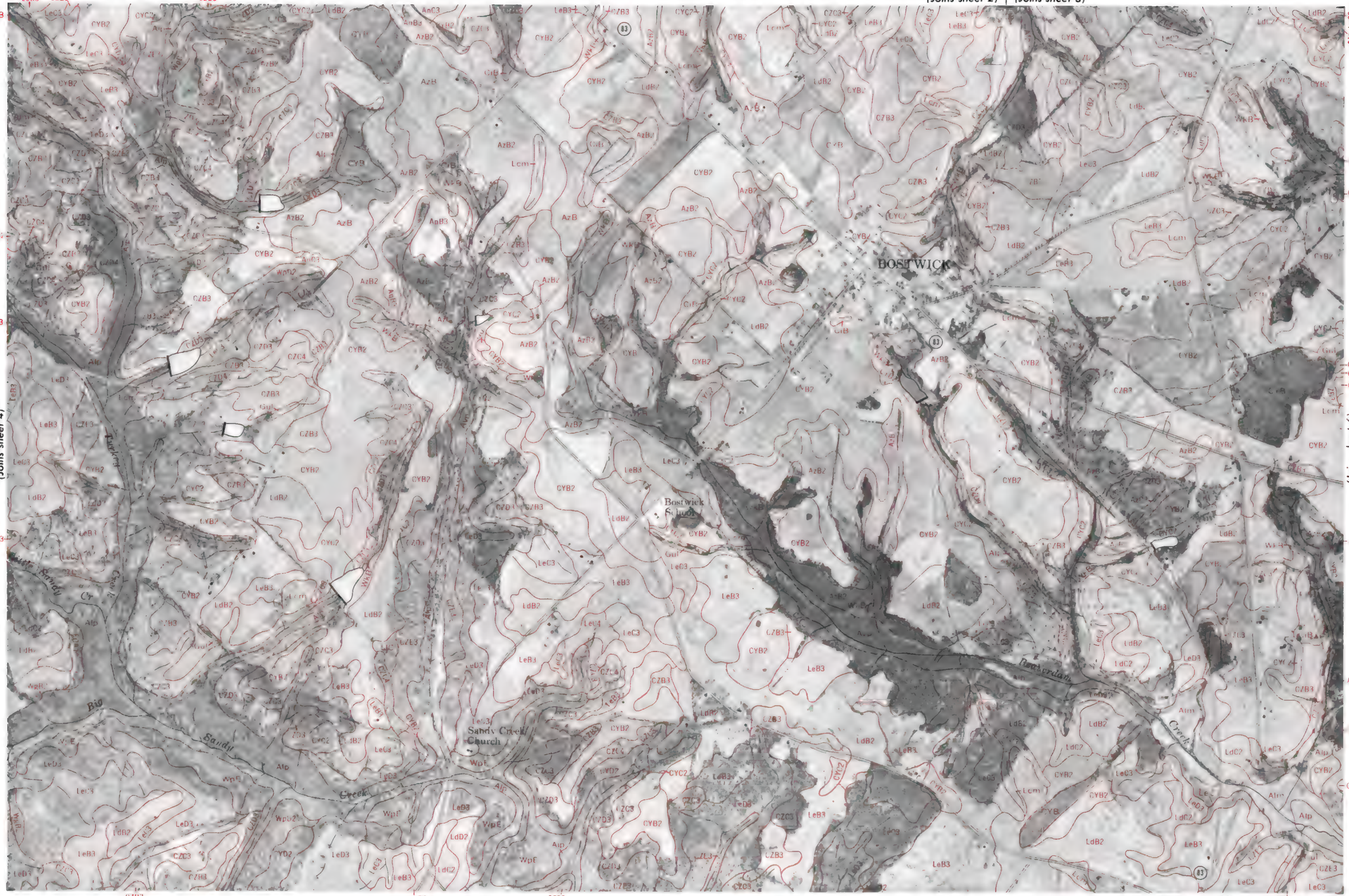
MORGAN COUNTY, GEORGIA — SHEET NUMBER 5

(Joins sheet 2) | (Joins sheet 3)



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MORGAN COUNTY, GEORGIA — SHEET NUMBER 6

6

N

(Joins sheet 3)

(Joins sheet 5)

(Joins sheet 9)

(Joins lower right)

(Joins sheet 10)

(Joins upper left)

OCONEE COUNTY

APALACHEE RIVER

Jacks Creek

Big Branch

Beaverdam

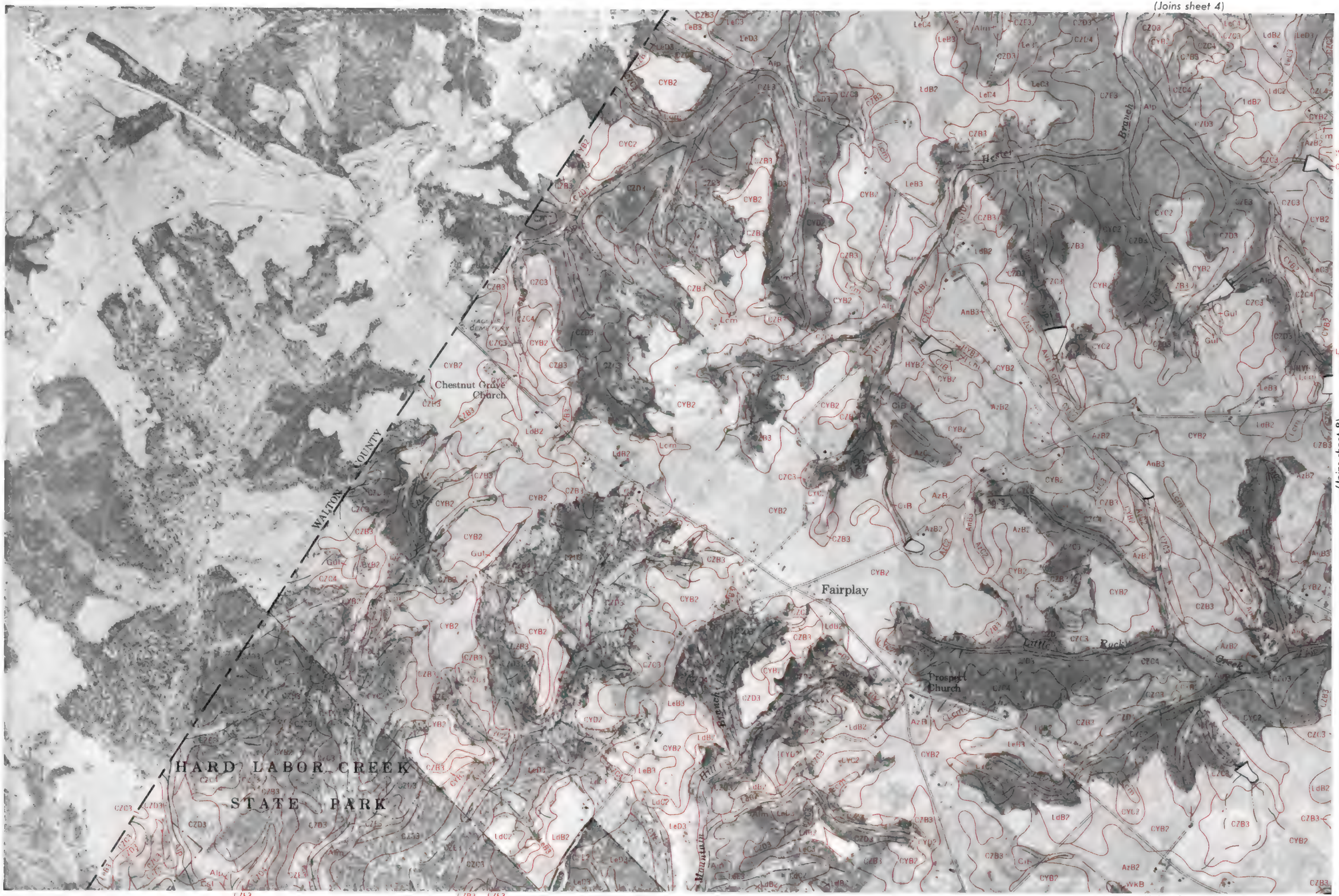
CENTRAL OF GEORGIA

0 ½ Mile

Scale 1:15 840

0 3000 Feet

MORGAN COUNTY, GEORGIA — SHEET NUMBER 7



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MORGAN COUNTY, GEORGIA — SHEET NUMBER 8

8

N

(Joins sheet 5)

(Joins sheet 7)

(Joins sheet 9)

(Joins sheet 12)

Rock Spring Church

Malcombs Store

Nolans Store

Sandy Creek Church

Flat Rock Church

Big Sandy Creek

Rocky Creek

Gibbs Pond

0 ½ Mile

Scale 1:15 840

0 3000 Feet

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(Joins sheet 8)

(Joins sheet 6)

(Joins sheet 10)

(Joins sheet 13)

9

N

Full Gospel Church

GEORGIA

CENTRAL

APALACHEE

Byxerdam Creek

Big Sandy Creek

Little Sandy Creek

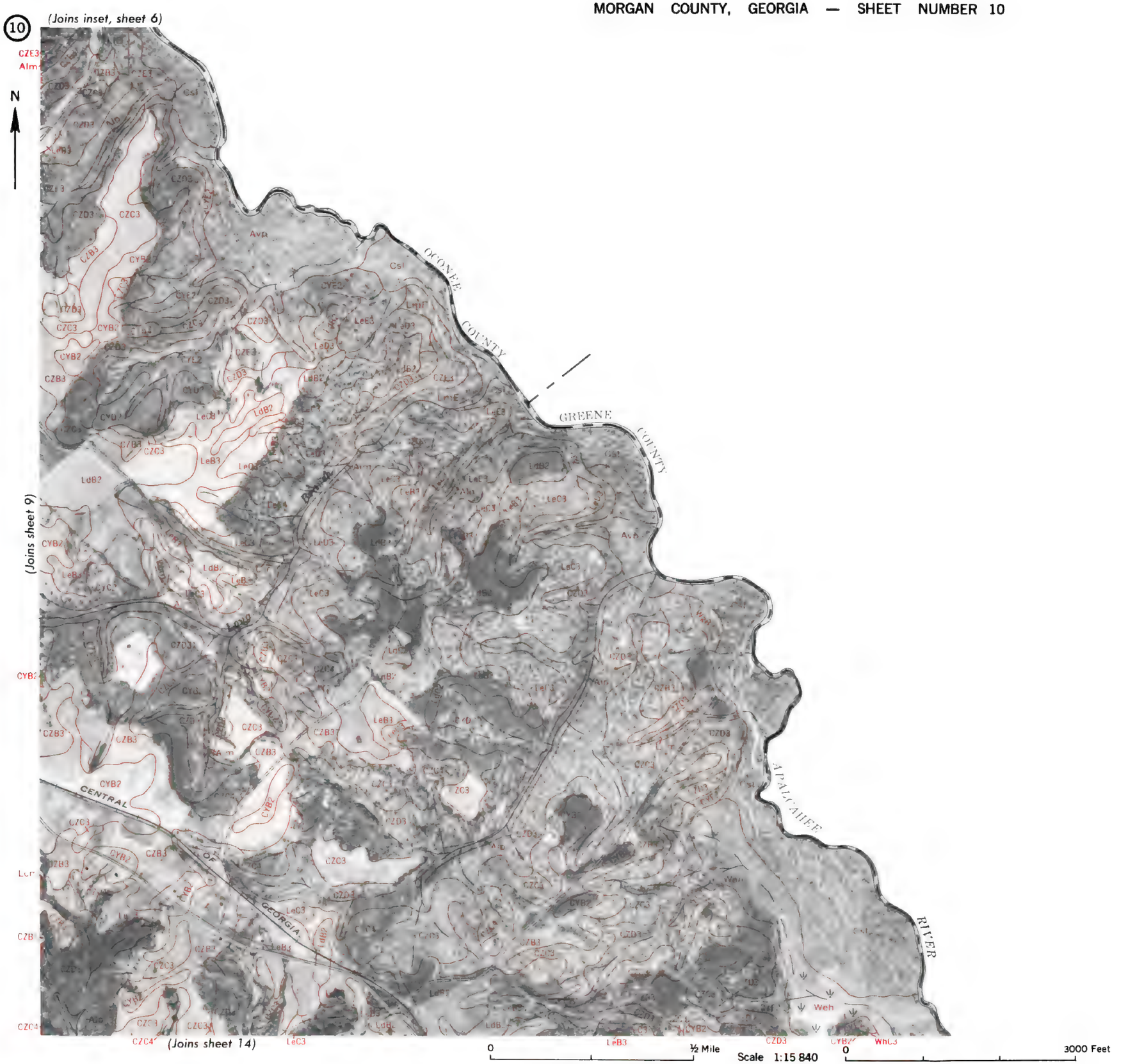
Lowe

Broad

0 ½ Mile

Scale 1:15 840

0 3000 Feet


10
(Joins inset, sheet 6)
N
(Joins sheet 9)
OCONEE
COUNTY
GREENE
COUNTY
APALACHEE
RIVER
CENTRAL
RAILROAD
OF
GEORGIA
(Joins sheet 14)
0
½ Mile
Scale 1:15 840
0
3000 Feet

MORGAN COUNTY, GEORGIA — SHEET NUMBER 11

(Joins sheet 7)

11

N

WALTON COUNTY

Lake Brantley

HARD LABOR CREEK

UNDERGROUND CABLE

H A R D L A B O R C R E E K S T A T E P A R K

L A K E R U T L E D G E

CAMP DAVID MORGAN

CAMP RUTLEDGE

Rocky Creek

Sandy Creek Branch

Little Sandy Creek

Hard Labor Creek

(Joins inset, sheet 4)

(Joins sheet 12)

(Joins sheet 16)

(Joins sheet 17)

0 ½ Mile

Scale 1:15 840

0 3000 Feet

This map is one of a set compiled in 1964 as part of a soil Survey by the Soil Conservation Service, United States Department of Agriculture, and the University of Georgia College of Agriculture, Agricultural Experiment Stations.

MORGAN COUNTY, GEORGIA — SHEET NUMBER 12

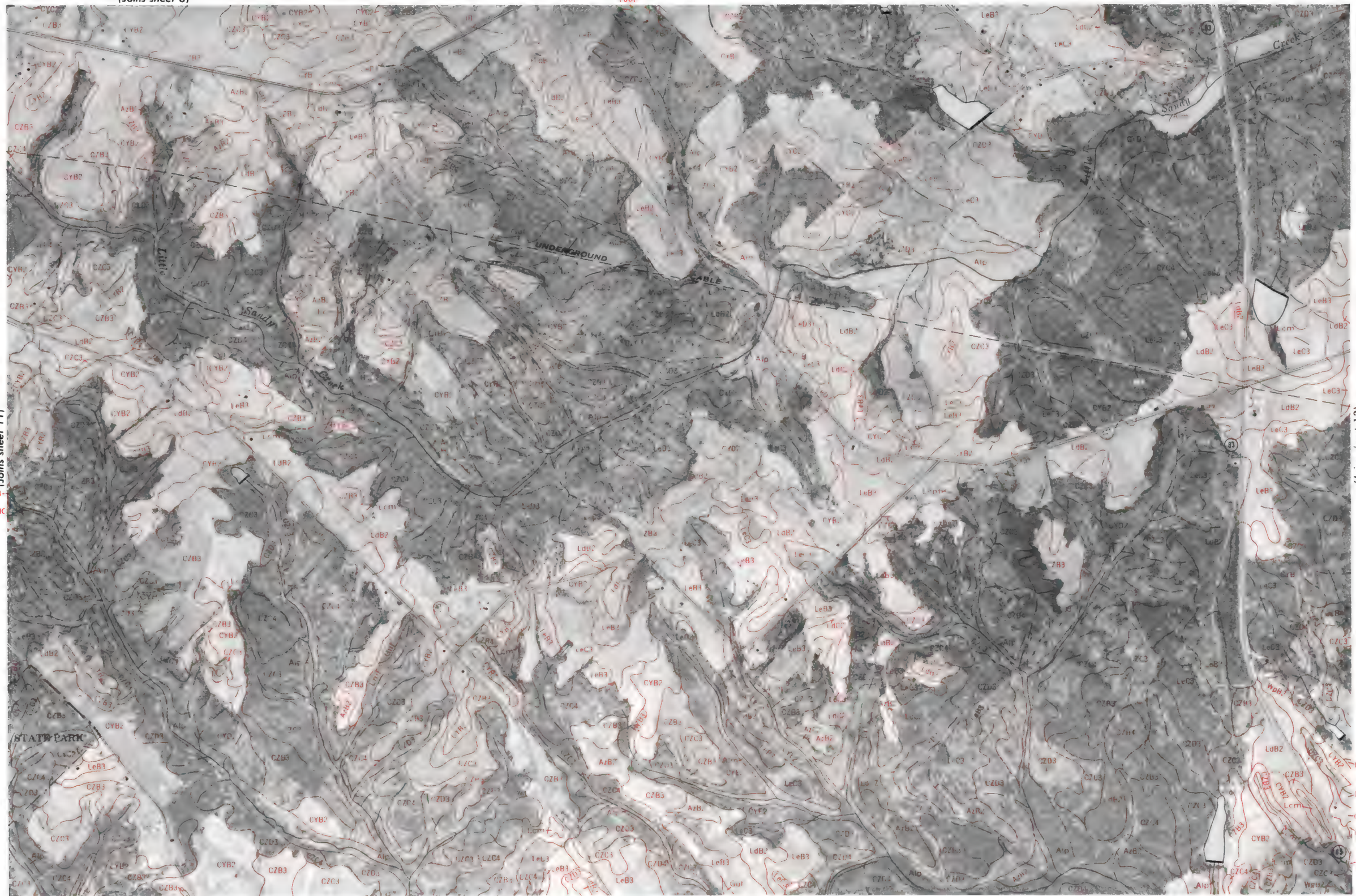
12

(Joins sheet 8)

N

(Joins sheet 11)

(Joins sheet 13)



0 ½ Mile

Scale 1:15 840

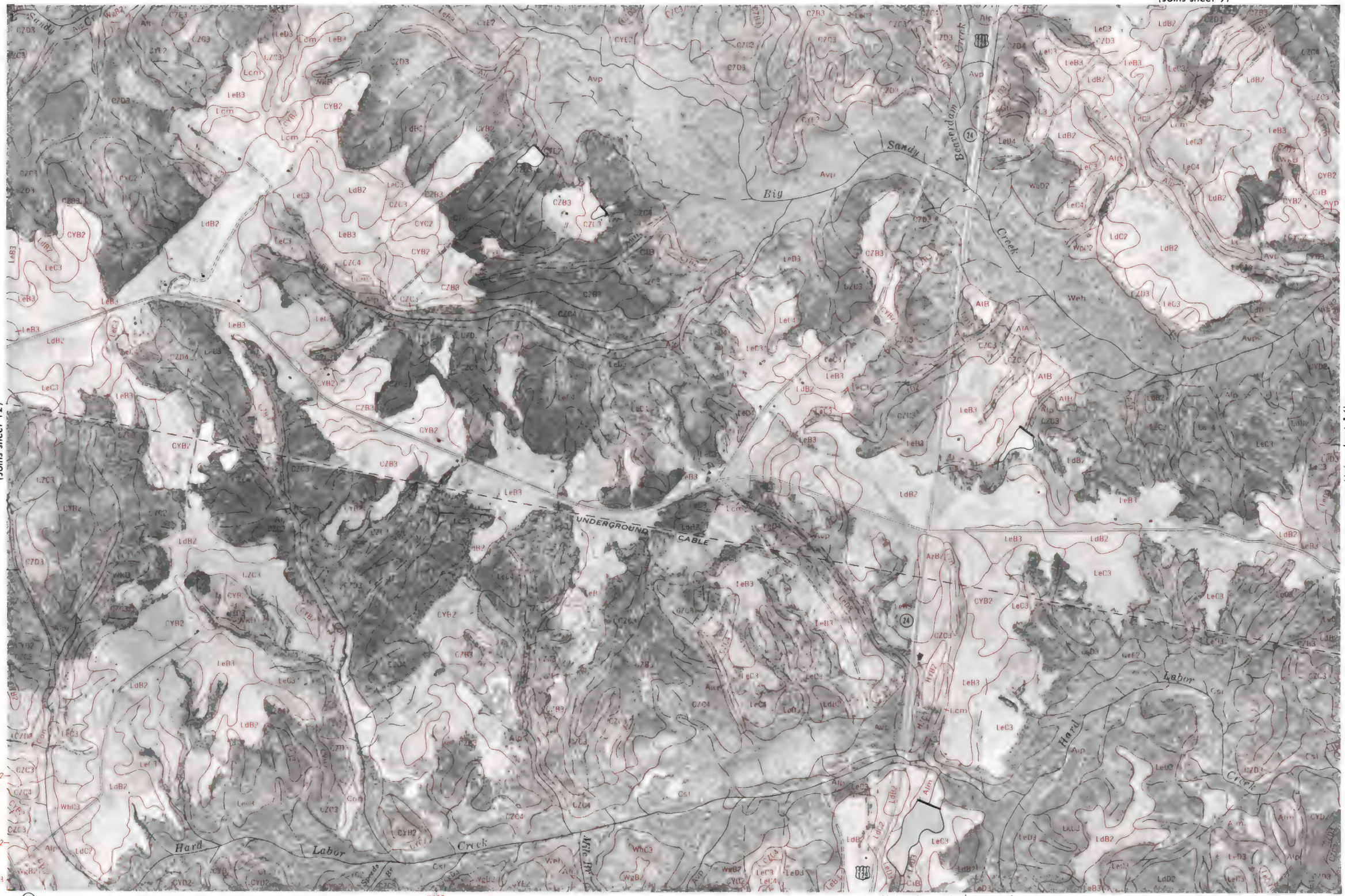
0 3000 Feet

(Joins sheet 17) | (Joins sheet 18)

(Joins sheet 9)

13

N



(Joins sheet 12)

(Joins sheet 14)

(Joins sheet 18) | (Joins sheet 19)

0 ½ Mile

Scale 1:15 840

0 3000 Feet

This map is one of a set compiled in 1964 as part of a soil Survey by the Soil Conservation Service, United States Department of Agriculture, and the University of Georgia College of Agriculture, Agricultural Experiment Stations.

(14)

(Joins sheet 10)

N

(Joins sheet 13)

St Paul's Church

GREENE COUNTY

CENTRAL OF GEORGIA

UNDERGROUND CABLE

APALACHEE RIVER

Sandy Creek

Lubon Creek

Hard Bill

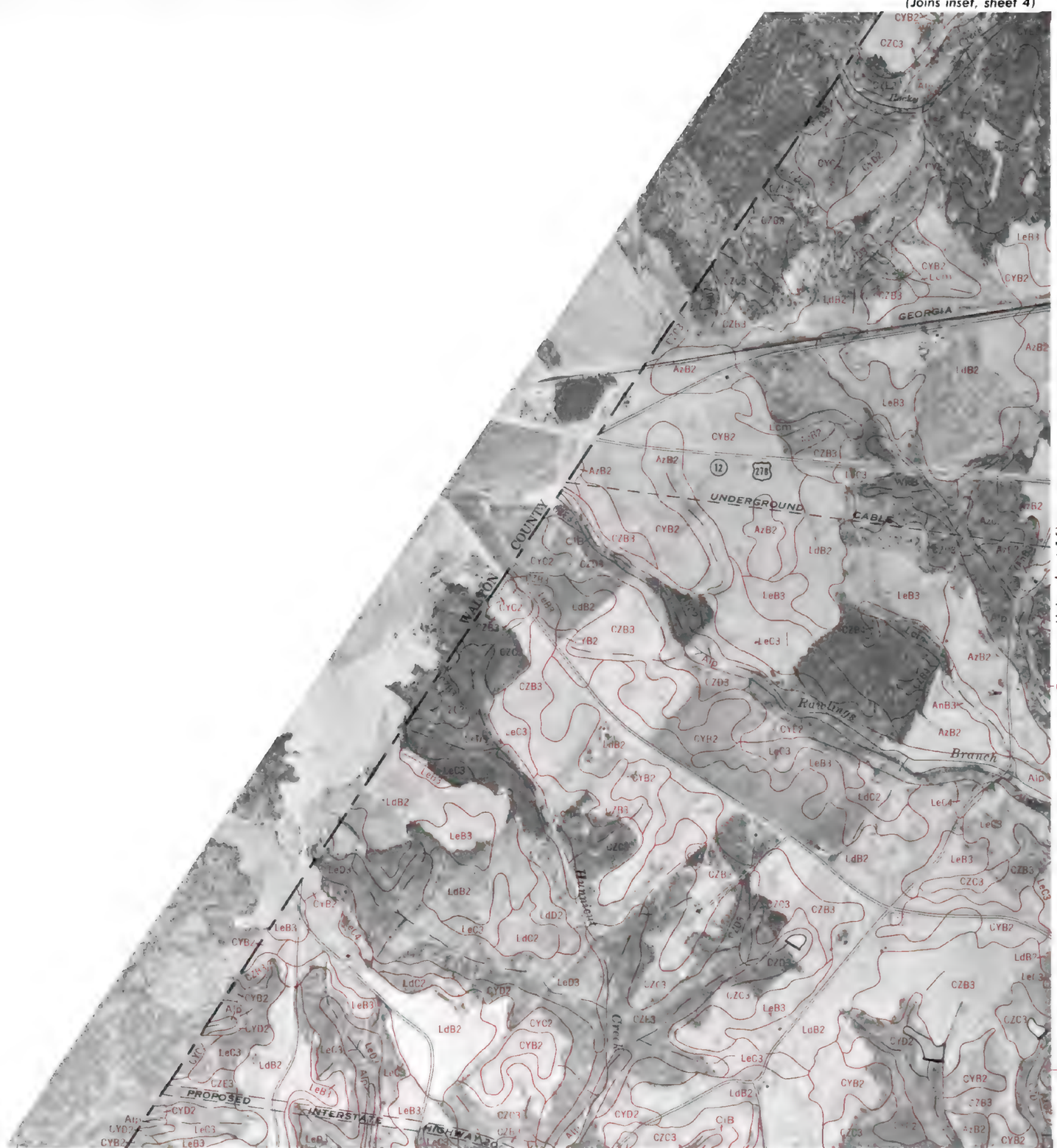
0 ½ Mile

Scale 1:15 840

0 3000 Feet

(Joins sheet 19) | (Joins sheet 20)

This map is one of a set compiled in 1964 as part of a soil Survey by the Soil Conservation Service, United States Department of Agriculture, and the University of Georgia College of Agriculture, Agricultural Experiment Stations.



16

N

(Joins inset, sheet 4) | (Joins sheet 11)

(Joins sheet 15)

(Joins sheet 17)

(Joins sheet 22)

LAKE RUTLEDGE

HARD LABOR CREEK STATE PARK

RUTLEDGE

GEORGIA

Union Springs Church

UNDERGROUND

CABLE

Rawlings Branch

Big Indian Creek

0 ½ Mile

Scale 1:15 840

0 3000 Feet

(Joins sheet 11)

(Joins sheet 12)

17

N

HARD LABOR CREEK STATE PARK

McHughs Hill Church

Hard Labor Creek

GEORGIA

(Joins sheet 16)

(Joins sheet 18)

(Joins sheet 23)

0 ½ Mile

Scale 1:15 840

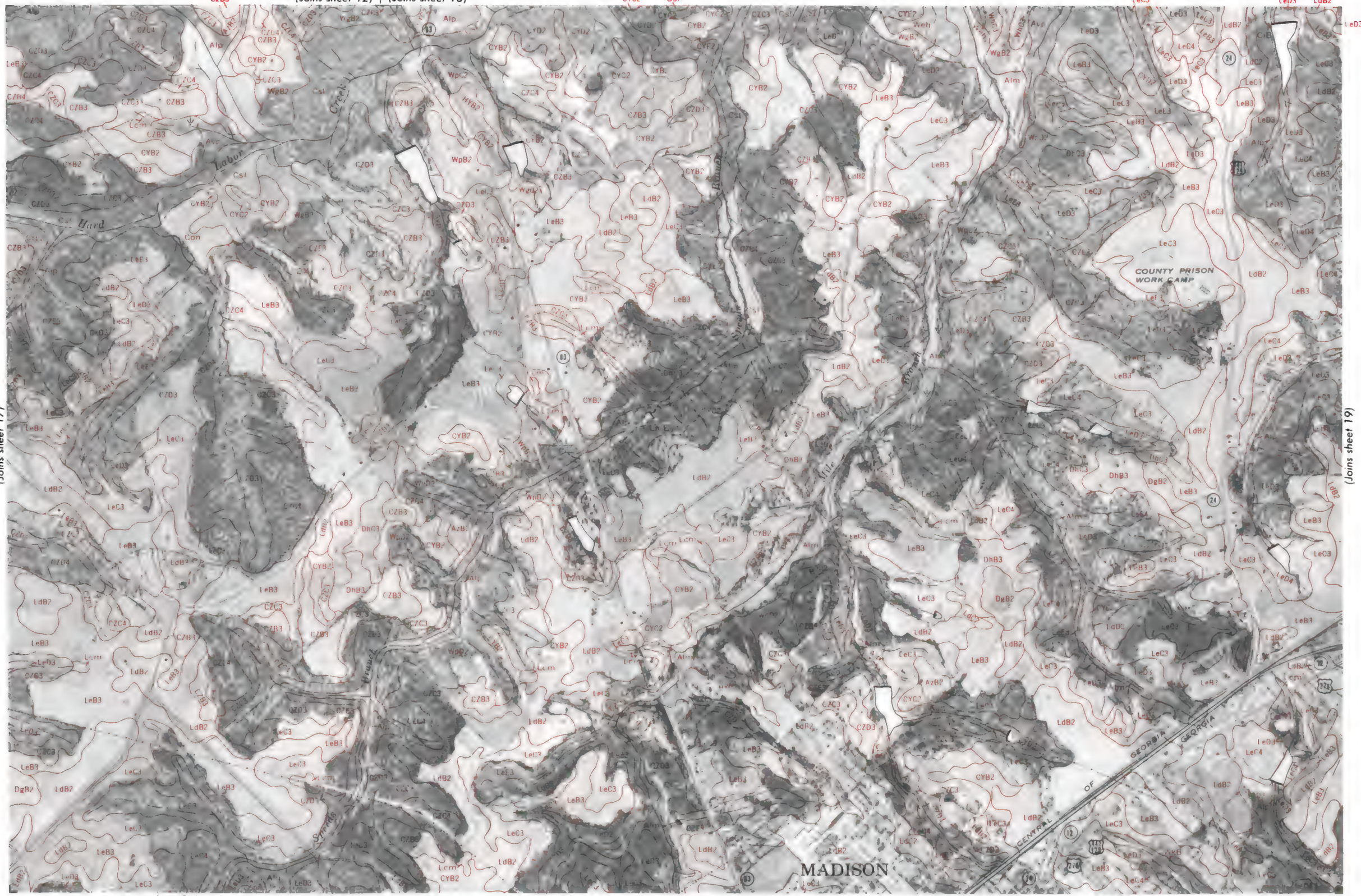
0 3000 Feet

This map is one of a set compiled in 1964 as part of a soil Survey by the Soil Conservation Service, United States Department of Agriculture, and the University of Georgia College of Agriculture, Agricultural Experiment Stations.

MORGAN COUNTY, GEORGIA — SHEET NUMBER 18

(Joins sheet 12) | (Joins sheet 13)

N

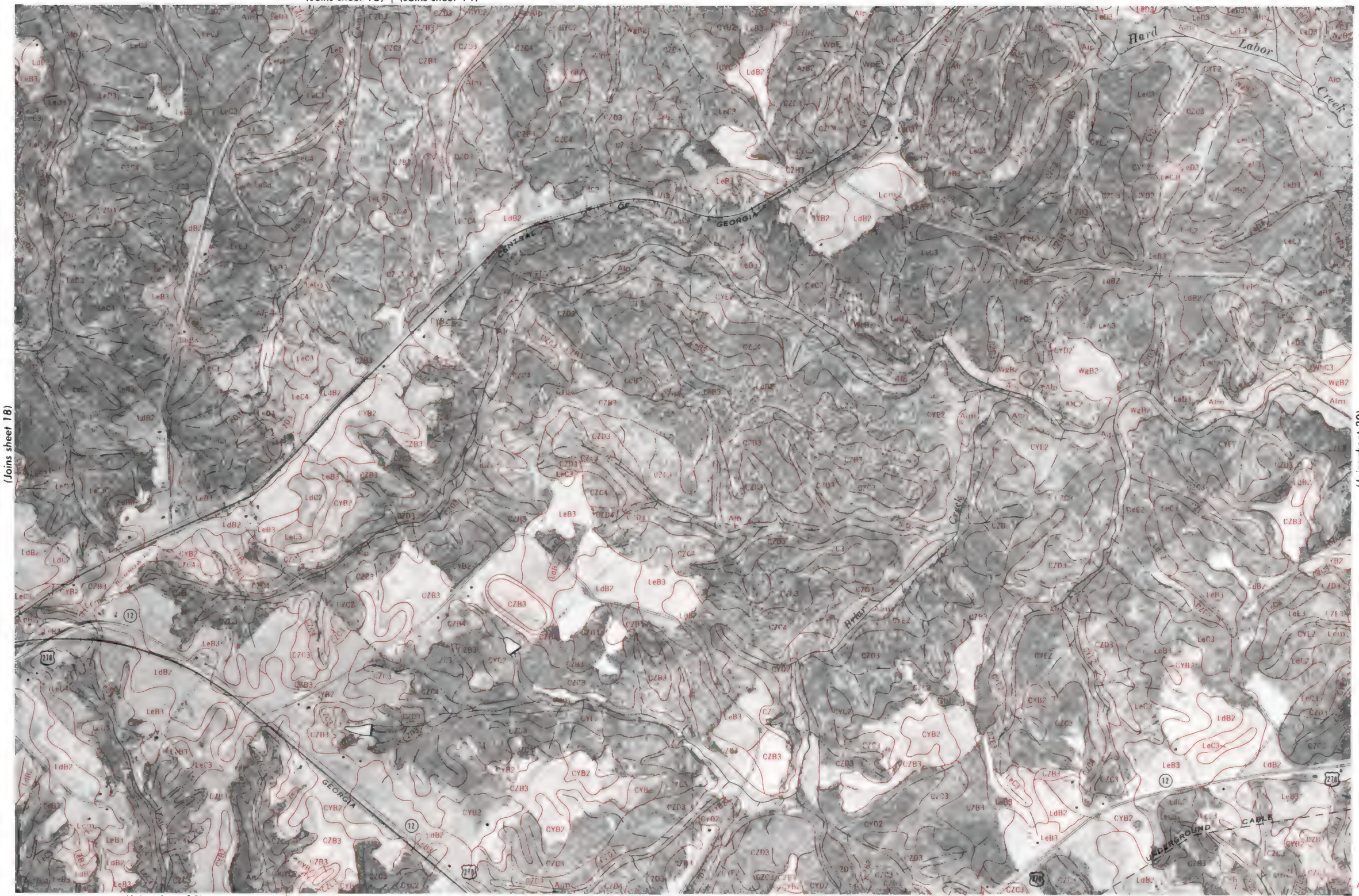


(Joins sheet 17)

(Joins sheet 19)

(Joins sheet 24)

0 ½ Mile Scale 1:15 840 0 3000 Feet



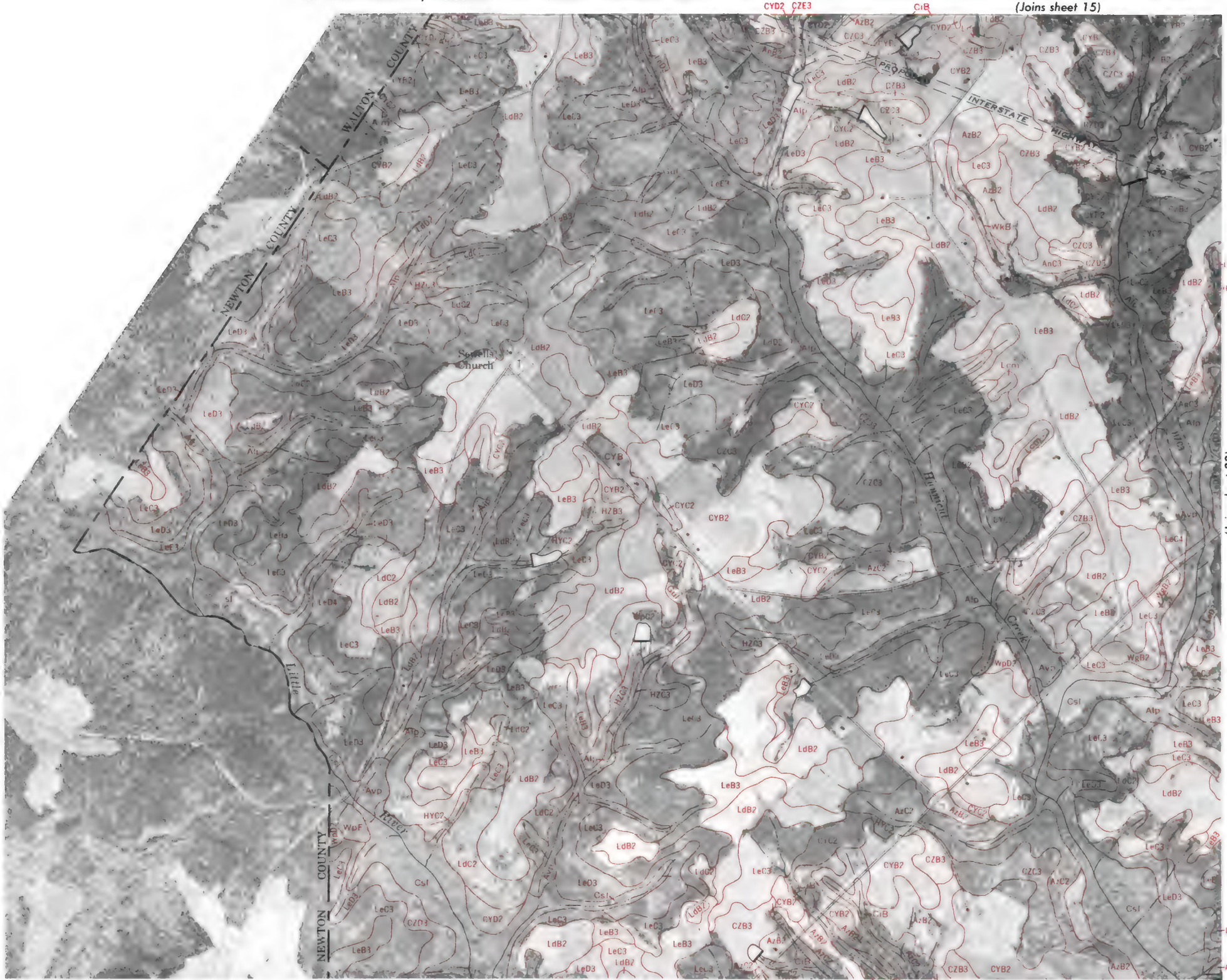
This map is one of a set compiled in 1964 as part of a soil Survey by the Soil Conservation Service, United States Department of Agriculture, and the University of Georgia College of Agriculture, Agricultural Experiment Stations.


20
N
(Joins sheet 14)
(Joins sheet 19)
(Joins sheet 26)
GREENE COUNTY
APALACHEE RIVER
Hard Labor Creek
Briar Creek
Sugar Creek Church
UNDERGROUND CABLE
CYB2
0
½ Mile
Scale 1:15 840
0
3000 Feet

MORGAN COUNTY, GEORGIA — SHEET NUMBER 21

(Joins sheet 15)

21



(Joins sheet 22)

(Joins sheet 27)

This map is one of a set compiled in 1964 as part of a soil Survey by the Soil Conservation Service, United States Department of Agriculture, and the University of Georgia College of Agriculture, Agricultural Experiment Stations.

MORGAN COUNTY, GEORGIA — SHEET NUMBER 22

22

(Joins sheet 16)

N

(Joins sheet 21)

(Joins sheet 23)

(Joins sheet 28)

Centennial

Moseley Church

Lower Moses Church

Rawlings Branch

PROPOSED INTERSTATE HIGHWAY 20

0 ½ Mile

Scale 1:15 840

0 3000 Feet

MORGAN COUNTY, GEORGIA — SHEET NUMBER 23

(Joins sheet 17)

(Joins sheet 22)

(Joins sheet 24)

(Joins sheet 29)

This map is one of a set compiled in 1964 as part of a soil Survey by the Soil Conservation Service, United States Department of Agriculture, and the University of Georgia College of Agriculture, Agricultural Experiment Stations.

Scale 1:15 840

0 ½ Mile

0 3000 Feet

MORGAN COUNTY, GEORGIA — SHEET NUMBER 24

24

N

(Joins sheet 18)

(Joins sheet 23)

(Joins sheet 25)

(Joins sheet 30)

MADISON

Beacon Heights

MADISON AIRPORT

BORROW PIT

CENTRAL OF GEORGIA

GEORGIA

UNDERGROUND CABLE

Spring Branch

Indian Creek

Little Indian Creek

Fourmile Branch

Alcovy River

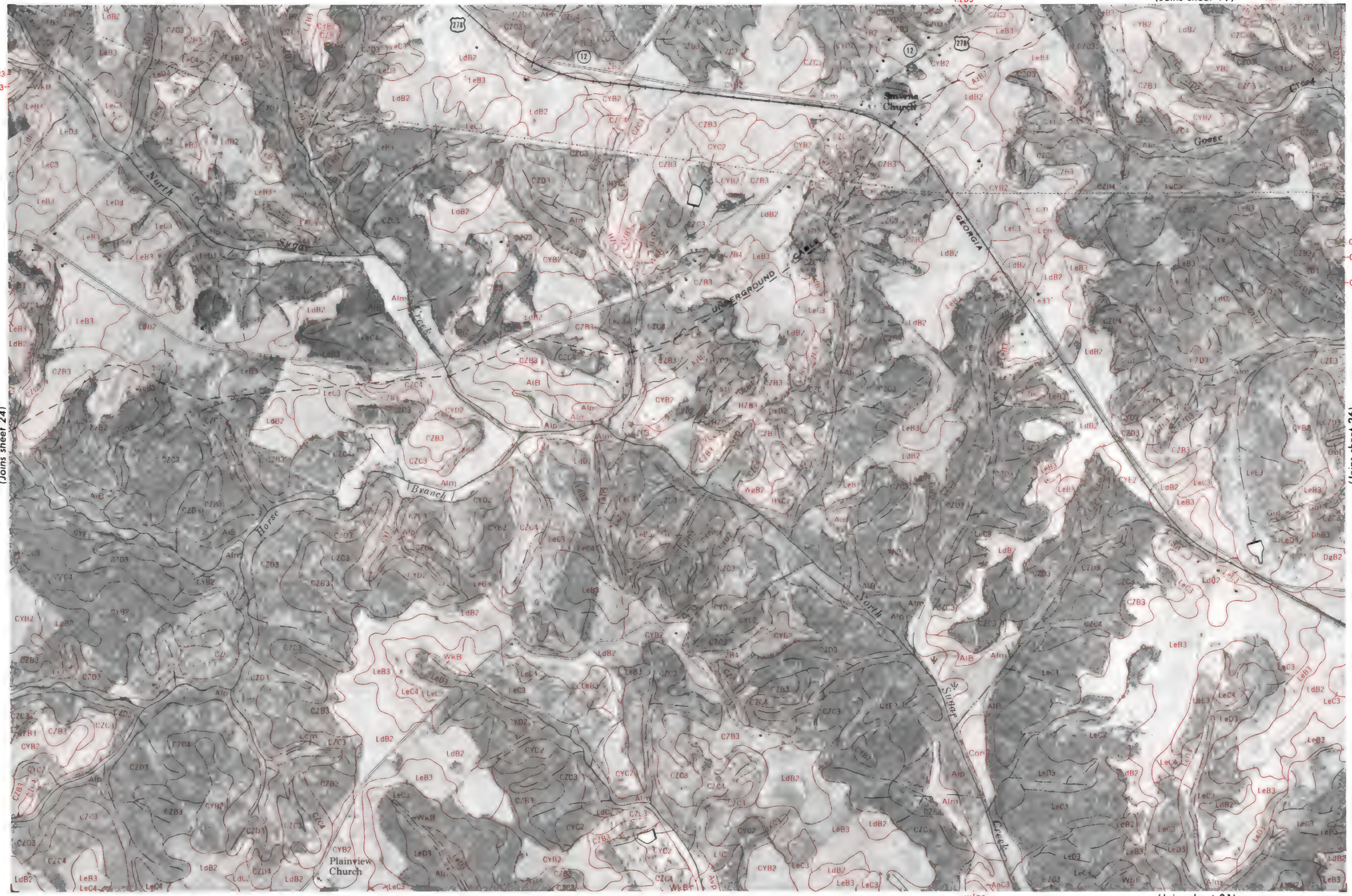
0 ½ Mile

Scale 1:15 840

0 3000 Feet

MORGAN COUNTY, GEORGIA — SHEET NUMBER 25

This map is one of a set compiled in 1964 as part of a soil Survey by the Soil Conservation Service, United States Department of Agriculture, and the University of Georgia College of Agriculture, Agricultural Experiment Stations.



MORGAN COUNTY, GEORGIA — SHEET NUMBER 26

(Joins sheet 20)

(Joins sheet 25)

N

APALACHEE RIVER

GREENE COUNTY

GEORGIA

BUCKHEAD

0 ½ Mile

Scale 1:15 840

0 3000 Feet

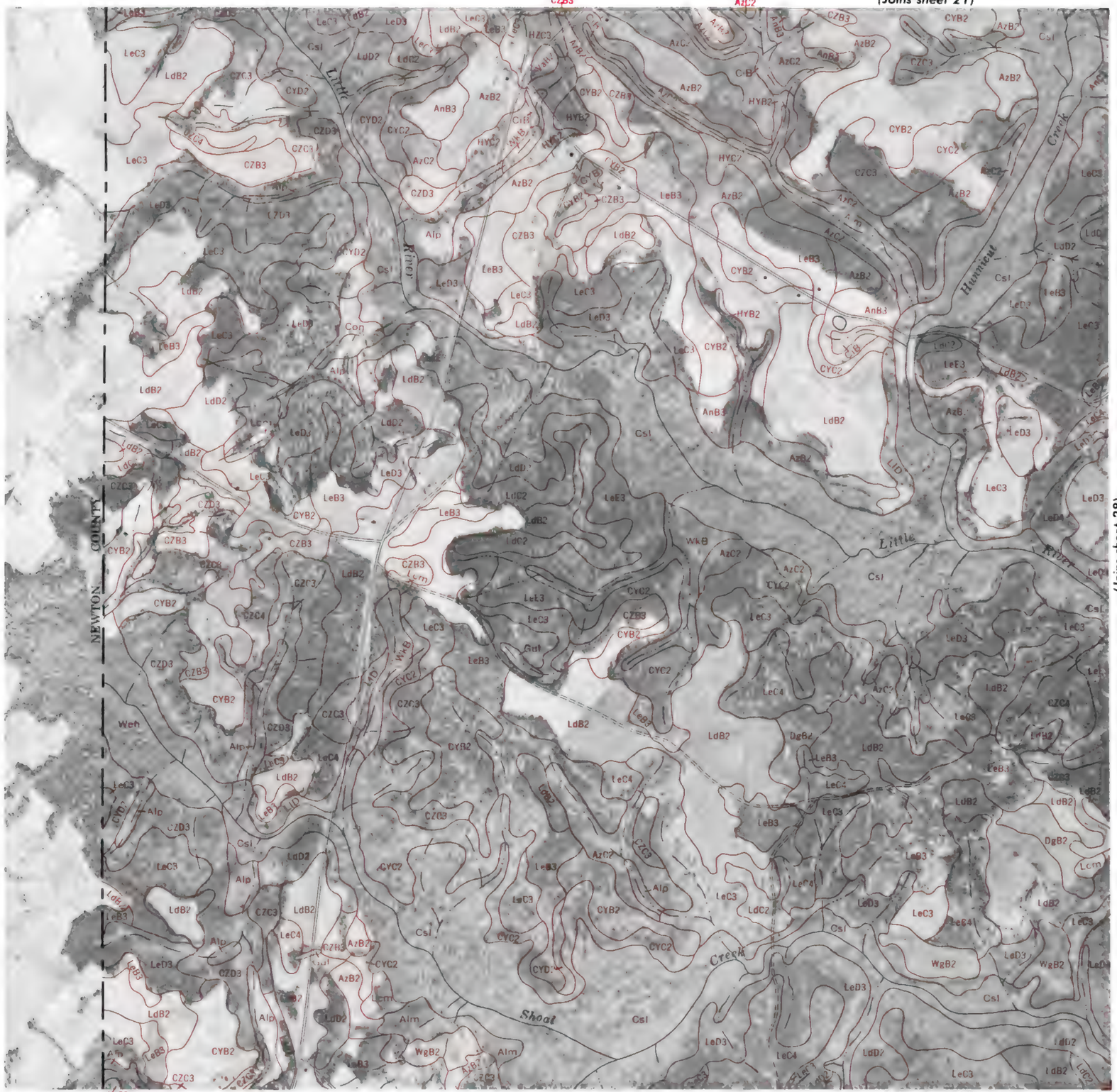
(Joins sheet 32) | (Joins 33)

MORGAN COUNTY, GEORGIA — SHEET NUMBER 27

(Joins sheet 21)

(Joins sheet 28)

(Joins sheet 34)



This map is one of a set compiled in 1964 as part of a soil Survey by the Soil Conservation Service, United States Department of Agriculture, and the University of Georgia College of Agriculture, Agricultural Experiment Stations.

MORGAN COUNTY, GEORGIA — SHEET NUMBER 28

28

N

(Joins sheet 22)

(Joins sheet 27)

(Joins sheet 29)

(Joins sheet 35)

Wallace Grove Church

Little Shoal Creek

Shoal Creek

Rocky Creek

Hodgers Creek

Alp

Scale 1:15 840

0 ½ Mile

0 3000 Feet

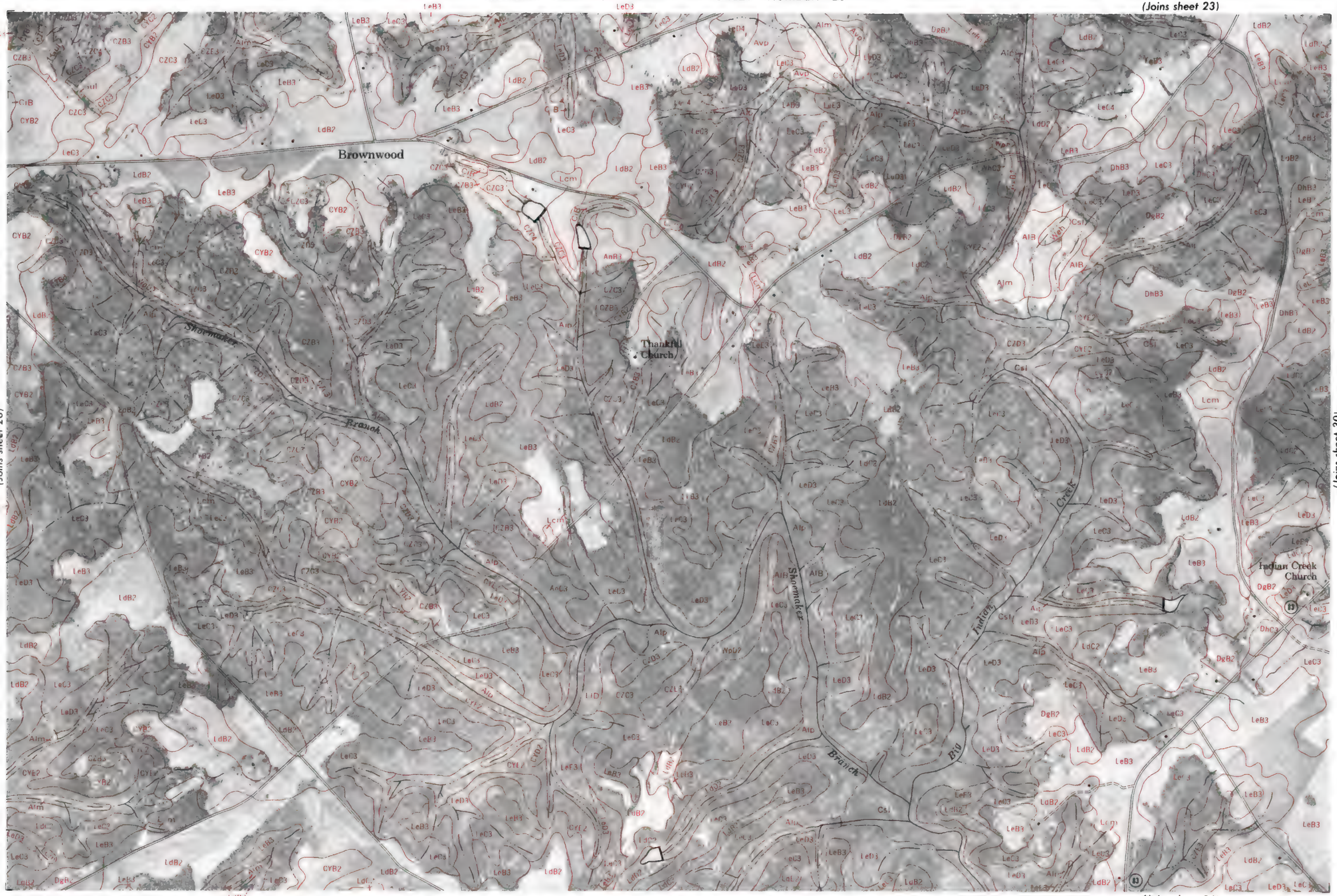
MORGAN COUNTY, GEORGIA — SHEET NUMBER 29

(Joins sheet 23)

(Joins sheet 28)

(Joins sheet 30)

(Joins sheet 36)



This map is one of a set compiled in 1964 as part of a soil Survey by the Soil Conservation Service, United States Department of Agriculture, and the University of Georgia College of Agriculture, Agricultural Experiment Stations.

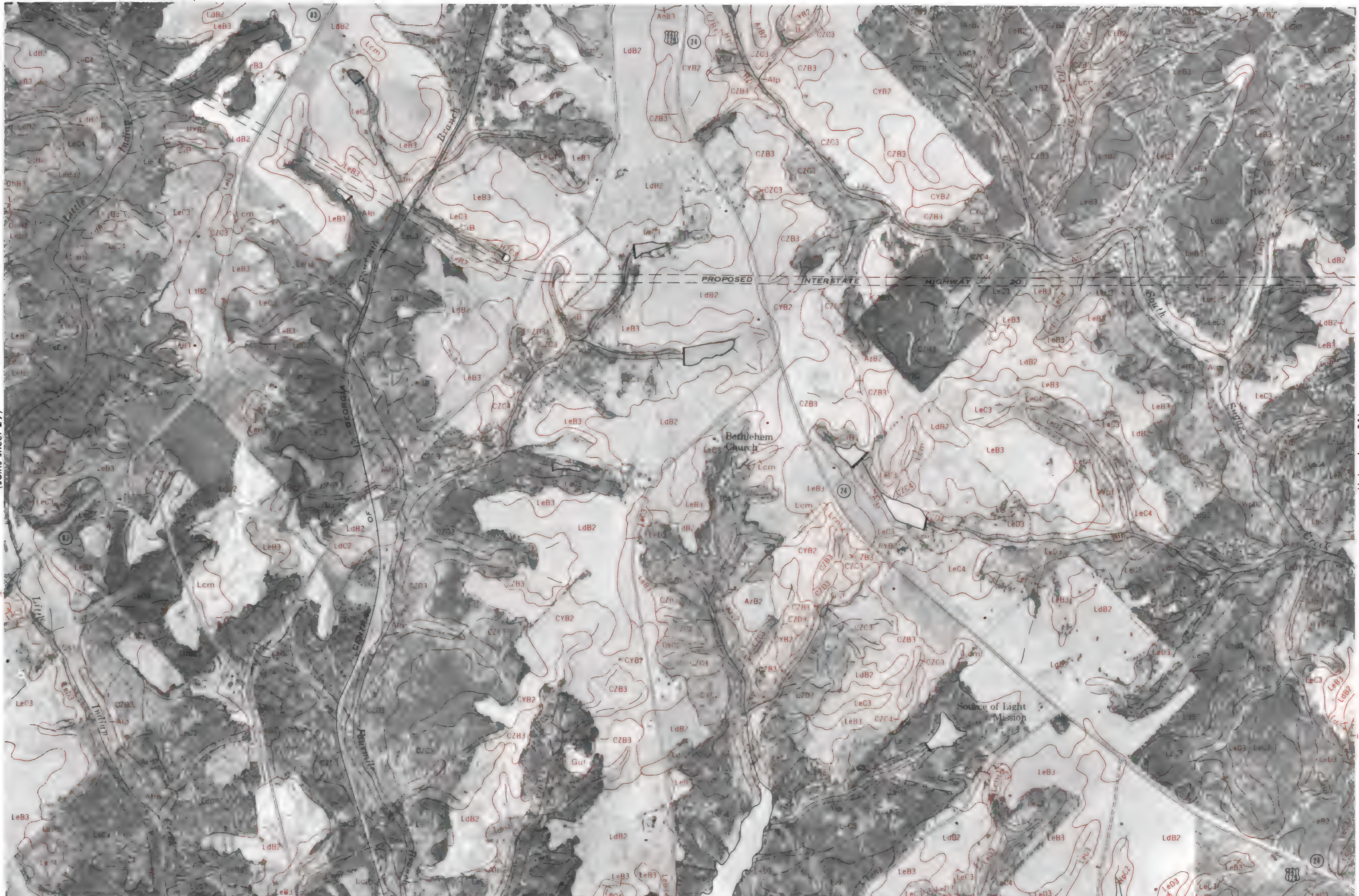
MORGAN COUNTY, GEORGIA — SHEET NUMBER 30

30

(Joins sheet 24)

N

(Joins sheet 29)



(Joins sheet 31)

(Joins sheet 37)

0 ½ Mile

Scale 1:15 840

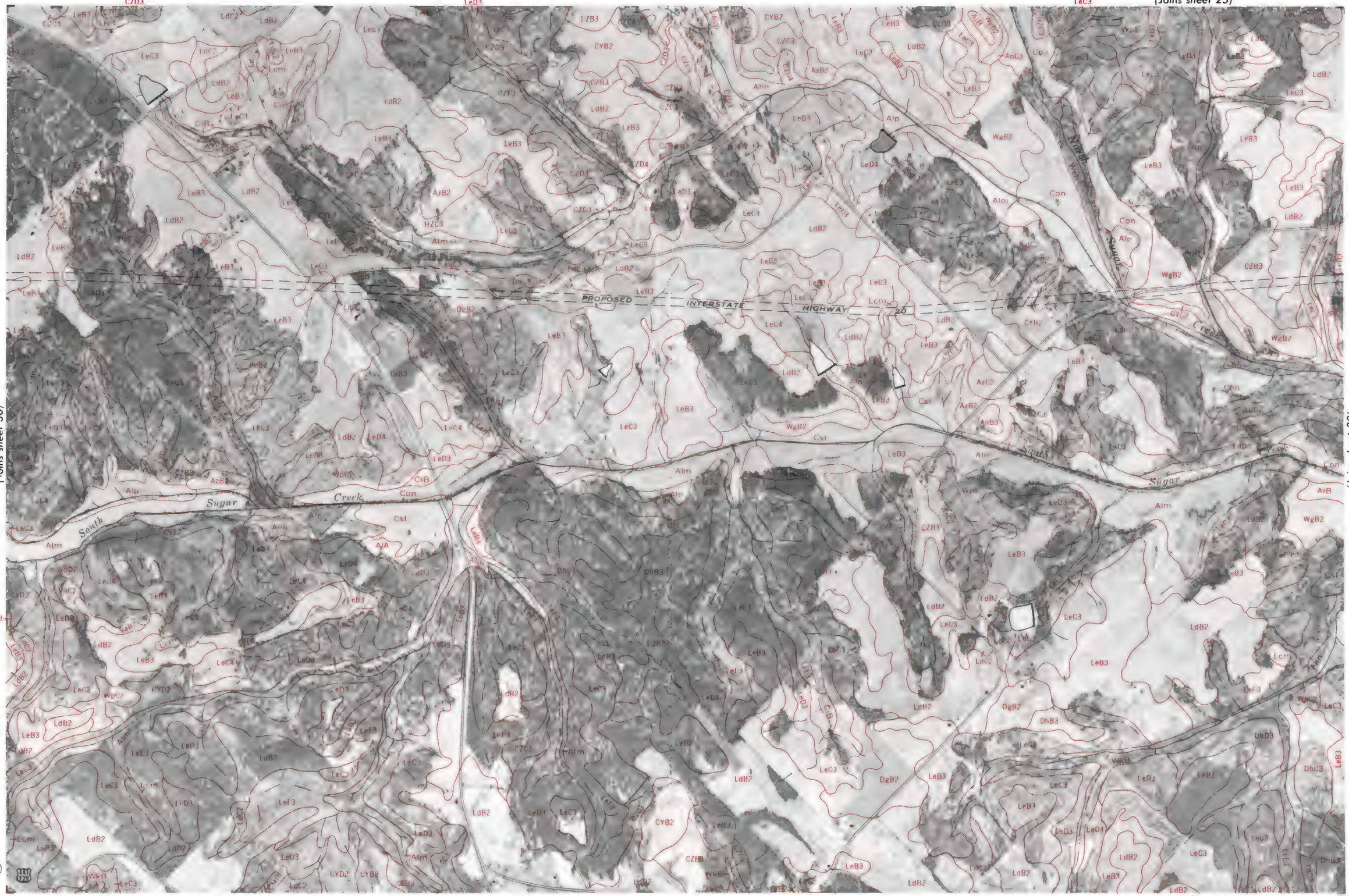
0 3000 Feet

MORGAN COUNTY, GEORGIA — SHEET NUMBER 31

(Joins sheet 25)

31

N



(Joins sheet 30)

(Joins sheet 32)

(Joins sheet 38)

0 ½ Mile Scale 1:15 840 0 3000 Feet

MORGAN COUNTY, GEORGIA — SHEET NUMBER 32

32

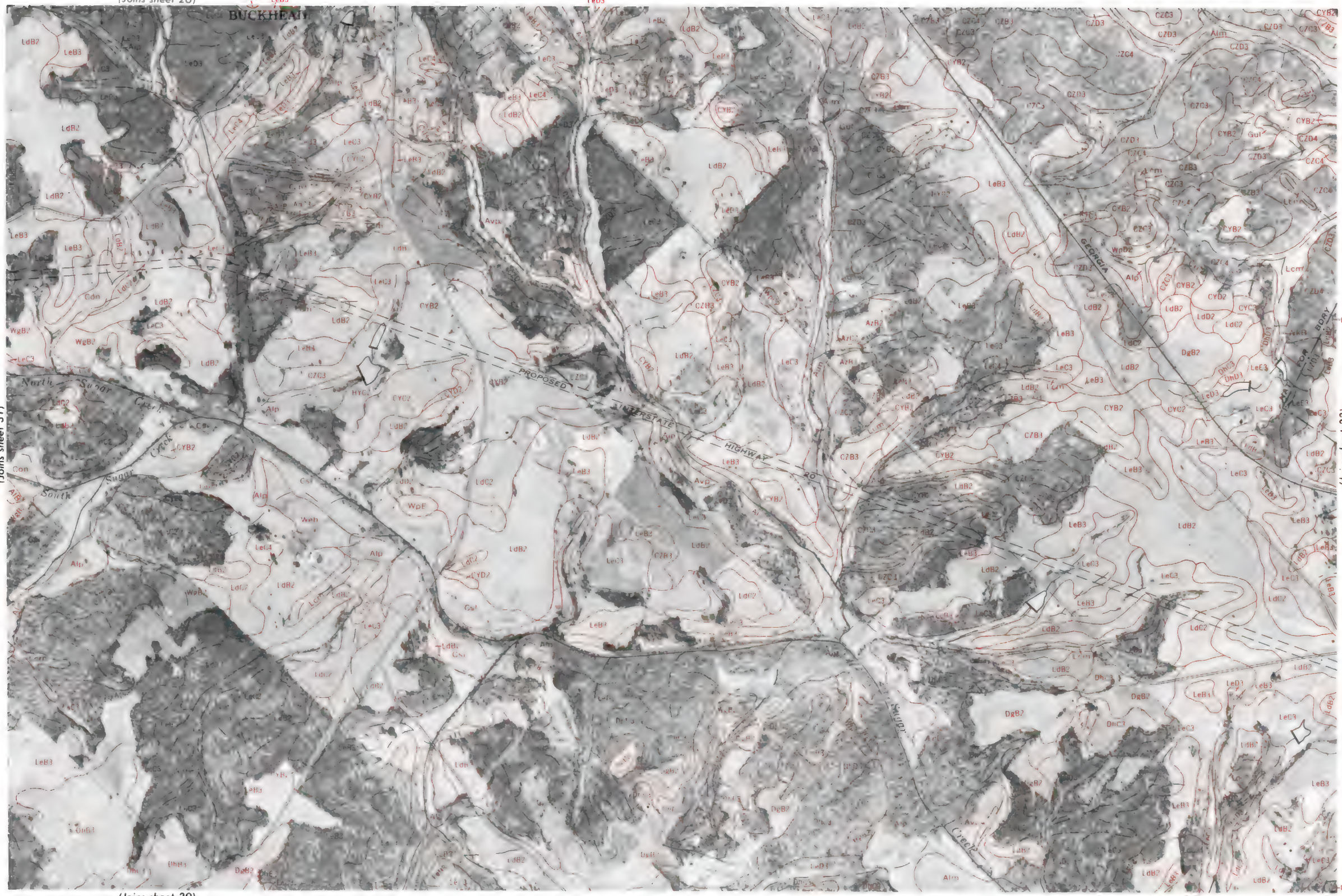
N

(Joins sheet 26)

(Joins sheet 31)

(Joins sheet 33)

(Joins sheet 39)



0 ½ Mile

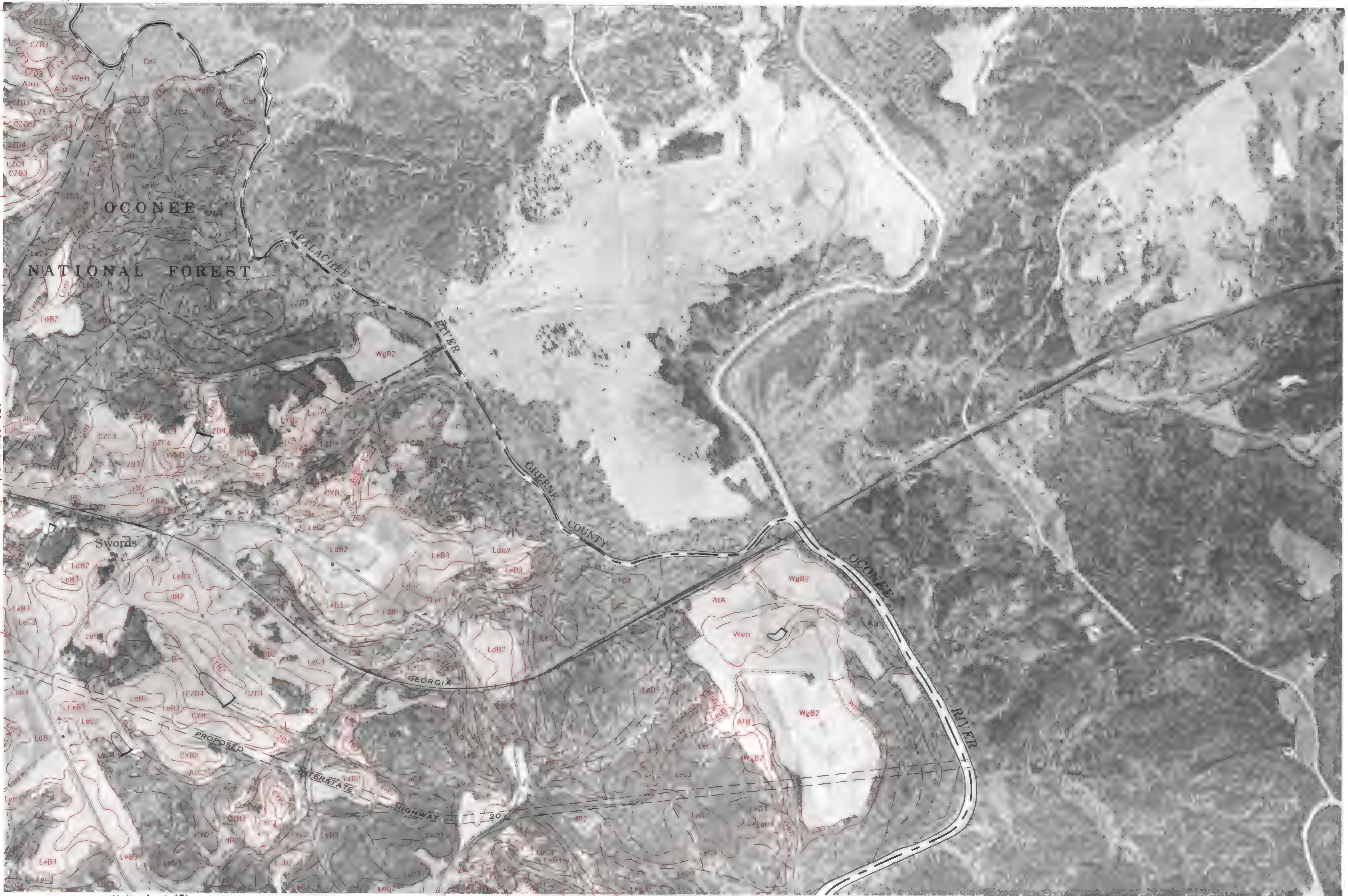
Scale 1:15 840

0 3000 Feet

MORGAN COUNTY, GEORGIA — SHEET NUMBER 33

(33)

(Joins 26)



(Joins sheet 32)

(Joins sheet 40)

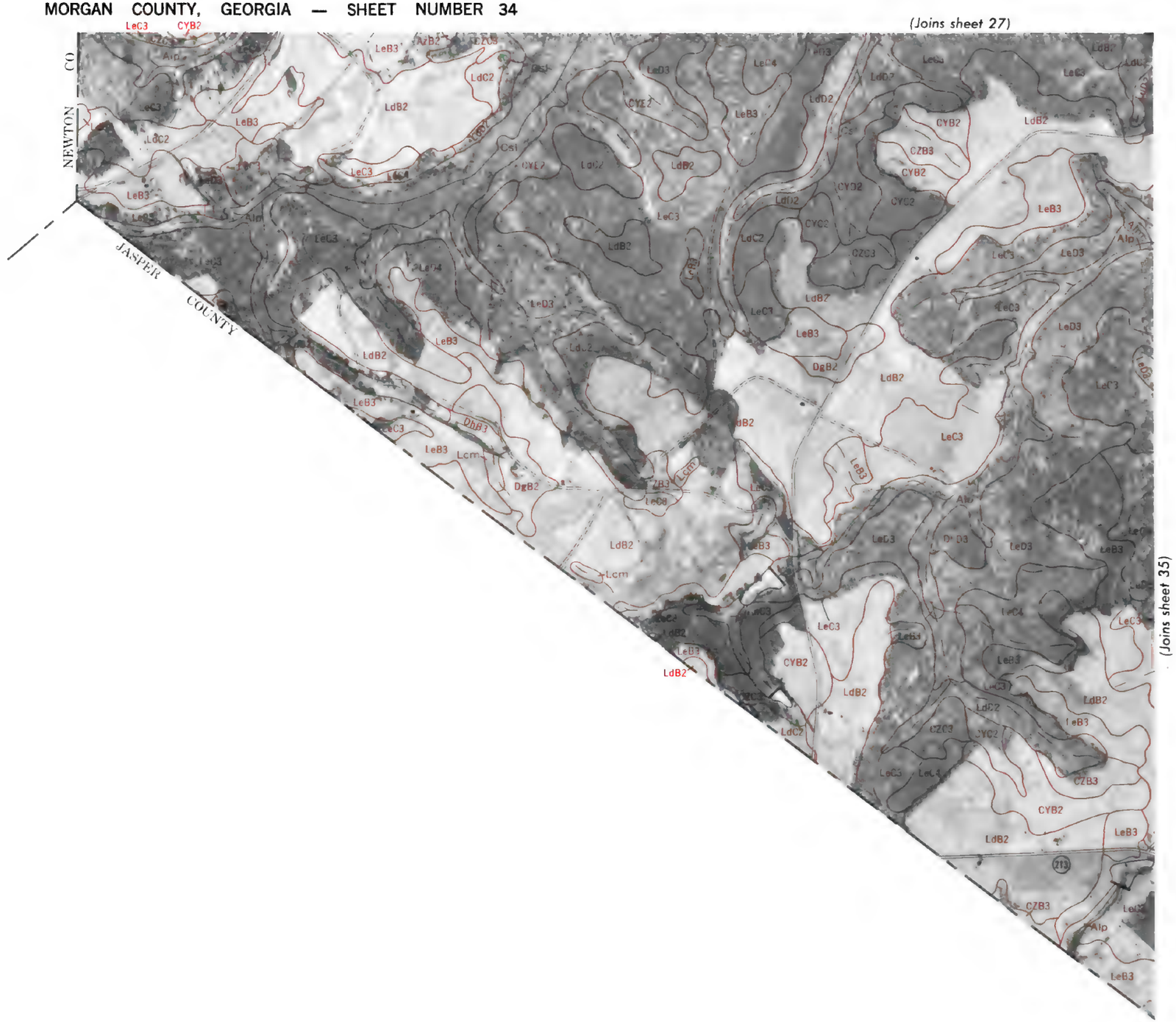
0 ½ Mile Scale 1:15 840 0 3000 Feet

This map is one of a set compiled in 1964 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the University of Georgia College of Agriculture, Agricultural Experiment Stations.

MORGAN COUNTY, GEORGIA — SHEET NUMBER 34

(34)

N



0 ½ Mile Scale 1:15 840 0 3000 Feet

MORGAN COUNTY, GEORGIA — SHEET NUMBER 35

(Joins sheet 28)

35

N

(Joins sheet 34)

(Joins sheet 36)

This map is one of a set compiled in 1954 as part of a soil Survey by the Soil Conservation Service, United States Department of Agriculture, and the University of Georgia College of Agriculture, Agricultural Experiment Stations.

Little Rutledge Creek

Rutledge Creek

Little Rutledge Creek

Carnes Creek

Wildcat Branch

Clacks Chapel

JASPER COUNTY

213

0 ½ Mile

Scale 1:15 840

0 3000 Feet

(Joins sheet 41)

MORGAN COUNTY, GEORGIA — SHEET NUMBER 36

36

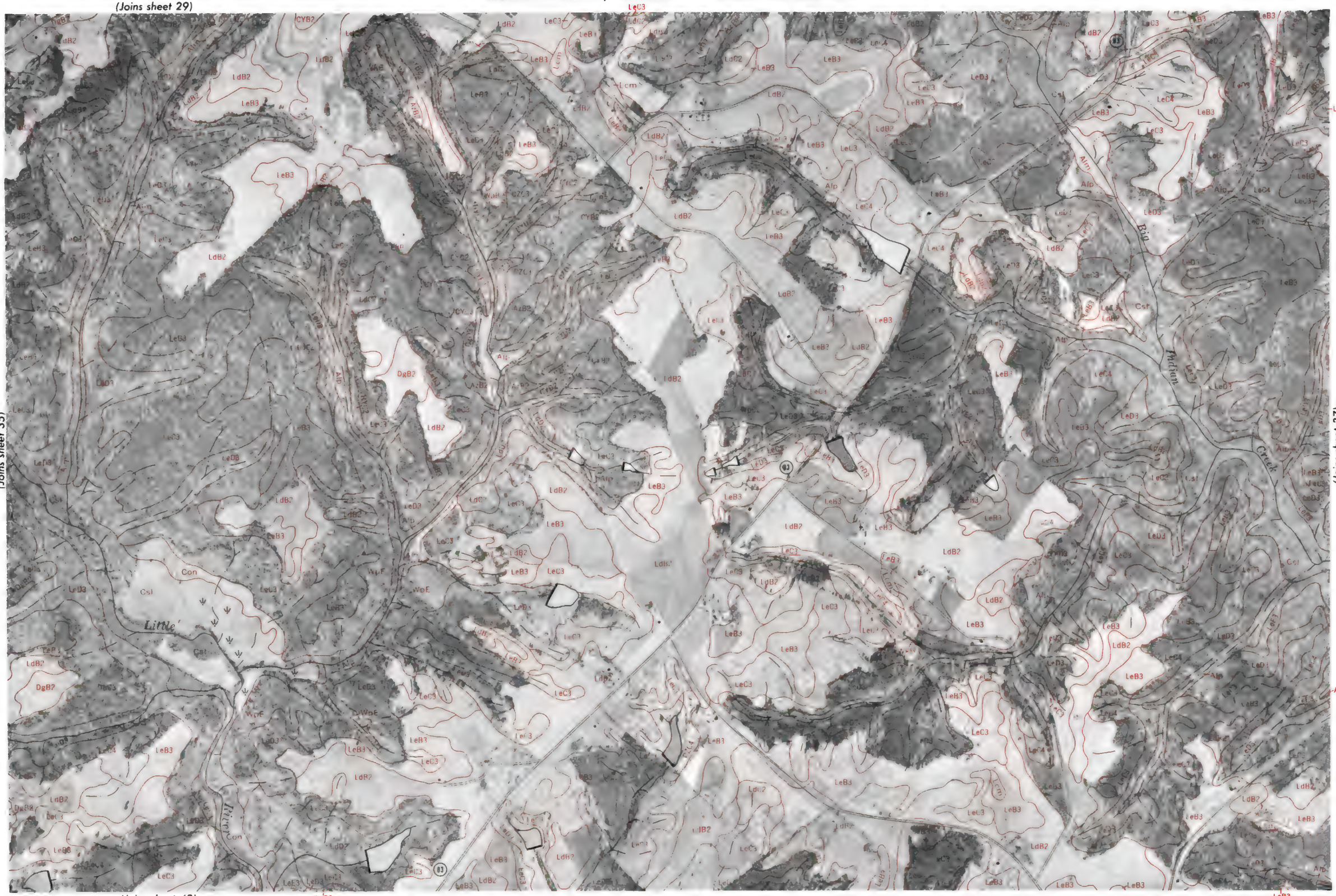
N

(Joins sheet 29)

(Joins sheet 35)

(Joins sheet 37)

(Joins sheet 42)



0 ½ Mile

Scale 1:15 840

0 3000 Feet

(Joins sheet 30)

37

N

(Joins sheet 36)

(Joins sheet 38)

This map is one of a set compiled in 1964 as part of a soil Survey by the Soil Conservation Service, United States Department of Agriculture, and the University of Georgia College of Agriculture, Agricultural Experiment Stations.

Aqua

Little Indian Creek

Powerline Branch

Big Indian Creek

Little Indian Creek

GEORGIA CENTRAL RR

0 ½ Mile

Scale 1:15 840

0 3000 Feet

(Joins sheet 43)

38

N

(Joins sheet 31)

(Joins sheet 37)

(Joins sheet 39)

(Joins sheet 44)

Bethany Church

Friendship Church

Springfield

Little Sugar Creek

0 ½ Mile

Scale 1:15 840

0 3000 Feet

MORGAN COUNTY, GEORGIA — SHEET NUMBER 39

(Joins sheet 32)

39

N

(Joins sheet 38)

(Joins sheet 40)

(Joins sheet 45)

Mt Zion Church

Sugar Creek

Sugar Creek

0 ½ Mile

Scale 1:15 840

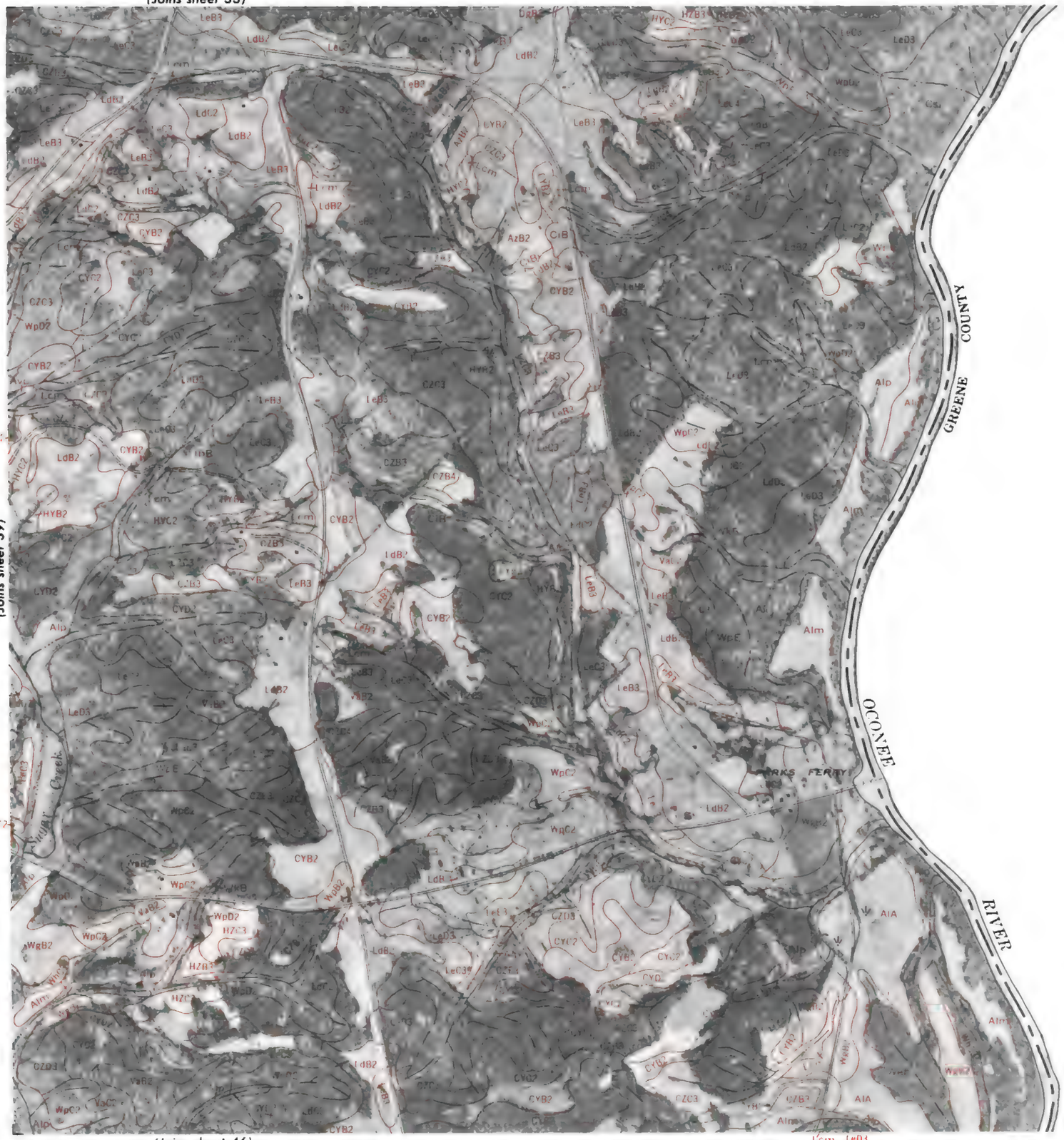
0 3000 Feet

This map is one of a set compiled in 1964 as part of a soil Survey by the Soil Conservation Service, United States Department of Agriculture, and the University of Georgia College of Agriculture, Agricultural Experiment Stations.

40

(Joins sheet 33)

N



(Joins sheet 39)

(Joins sheet 46)

0 ½ Mile

Scale 1:15 840

0 3000 Feet

(Joins sheet 35)

41

N

Wildcat Branch

Gap Creek

JASPER COUNTY

213

(Joins sheet 42)

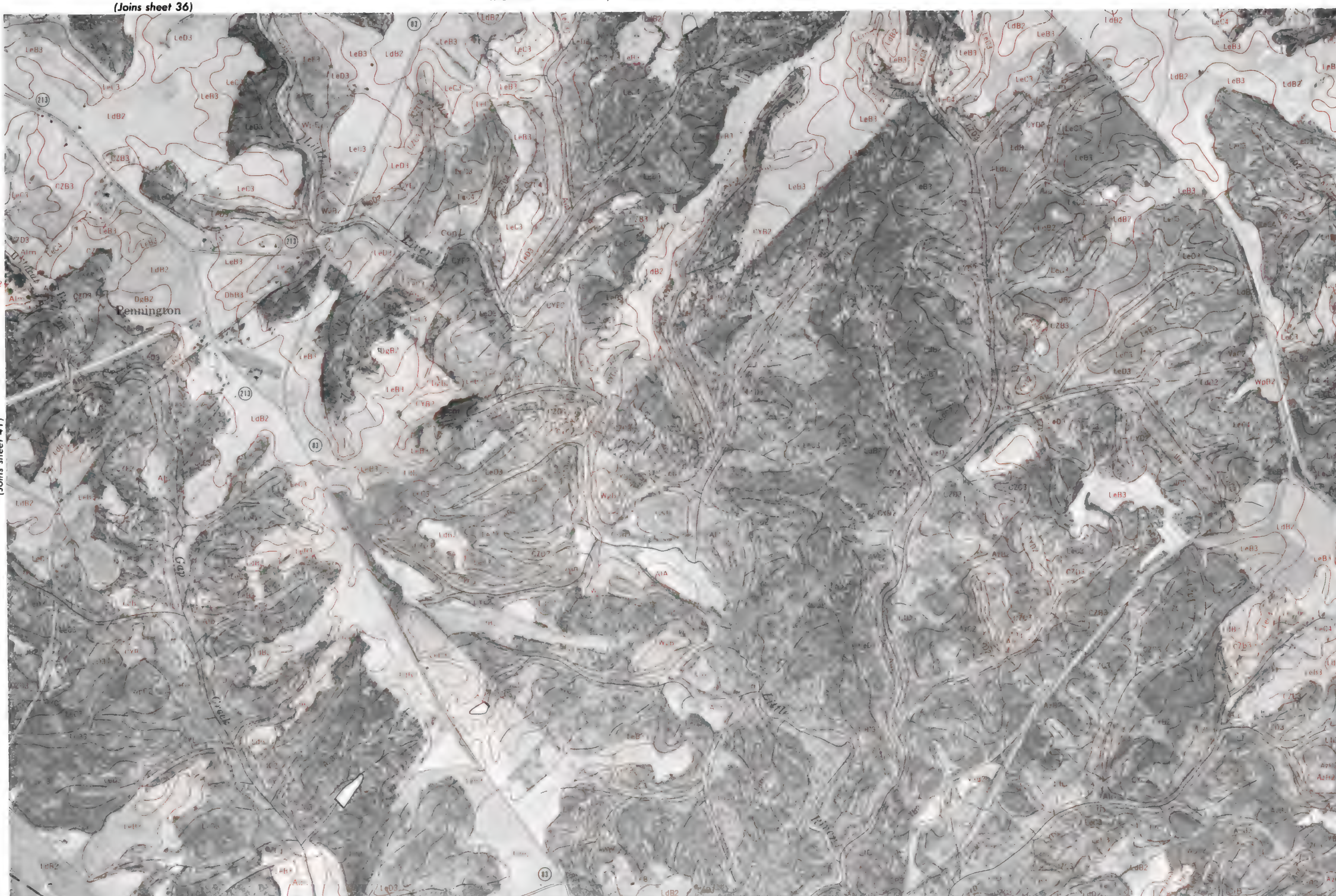
This map is one of a set compiled in 1964 as part of a soil Survey by the Soil Conservation Service, United States Department of Agriculture, and the University of Georgia College of Agricultural Experiment Stations.

0 ½ Mile Scale 1:15 840 0 3000 Feet

42

(Joins sheet 36)

N



(Joins sheet 41)

(Joins sheet 43)

(Joins sheet 47)

0 ½ Mile

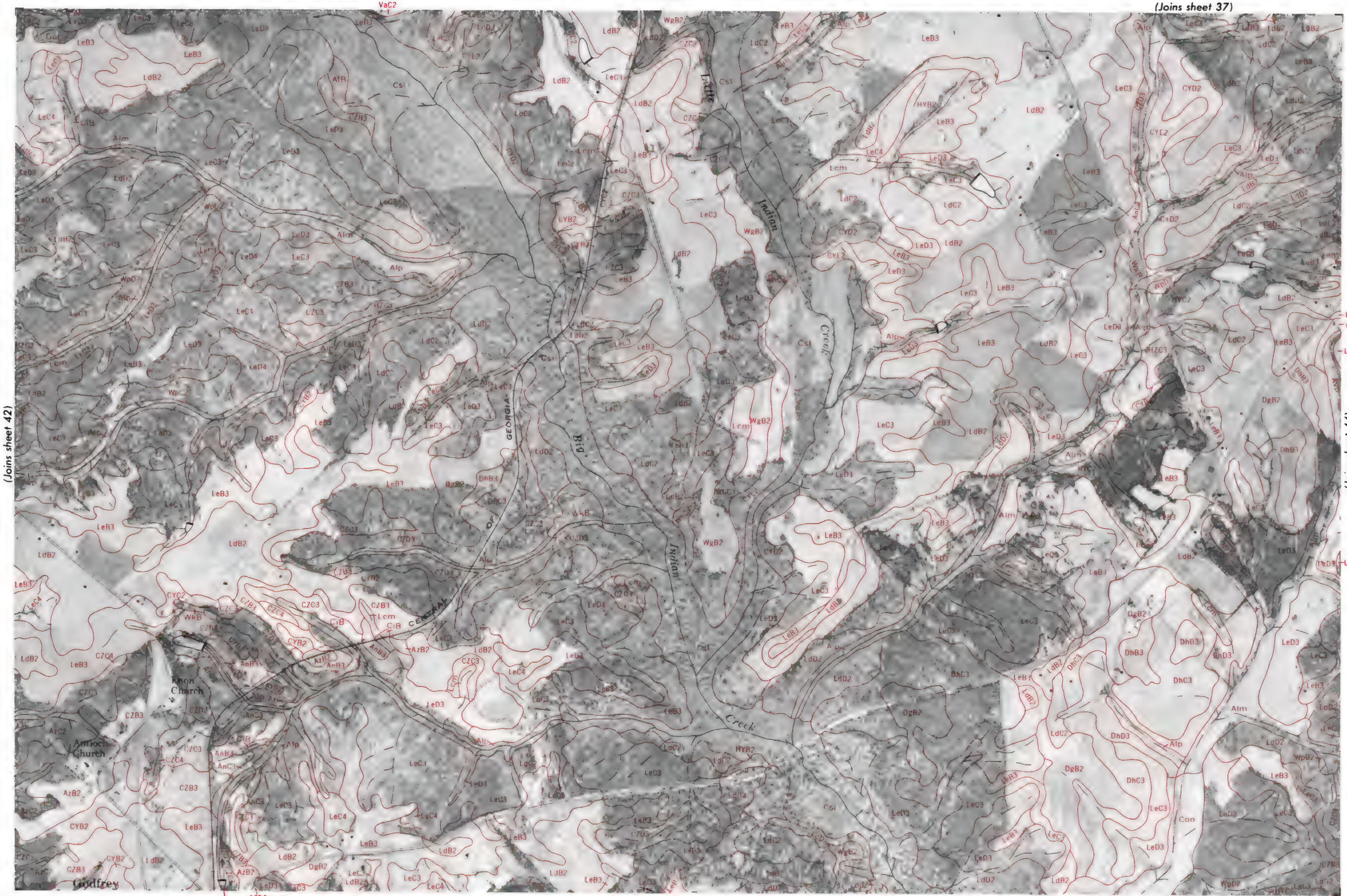
Scale 1:15 840

0 3000 Feet

MORGAN COUNTY, GEORGIA — SHEET NUMBER 43

(Joins sheet 37)

(43)



0 ½ Mile

Scale 1:15 840

0 3000 Feet

(44)

(Joins sheet 38)

N

(Joins sheet 43)

(Joins sheet 45)

(Joins inset, sheet 48)

Springfield

Little Sugar Creek

PUTNAM COUNTY

0 ½ Mile

Scale 1:15 840

0 3000 Feet

(Joins sheet 39)

(Joins sheet 44)

(Joins sheet 46)

45

N

PUTNAM COUNTY

Little Sugar Creek

Sugar Creek

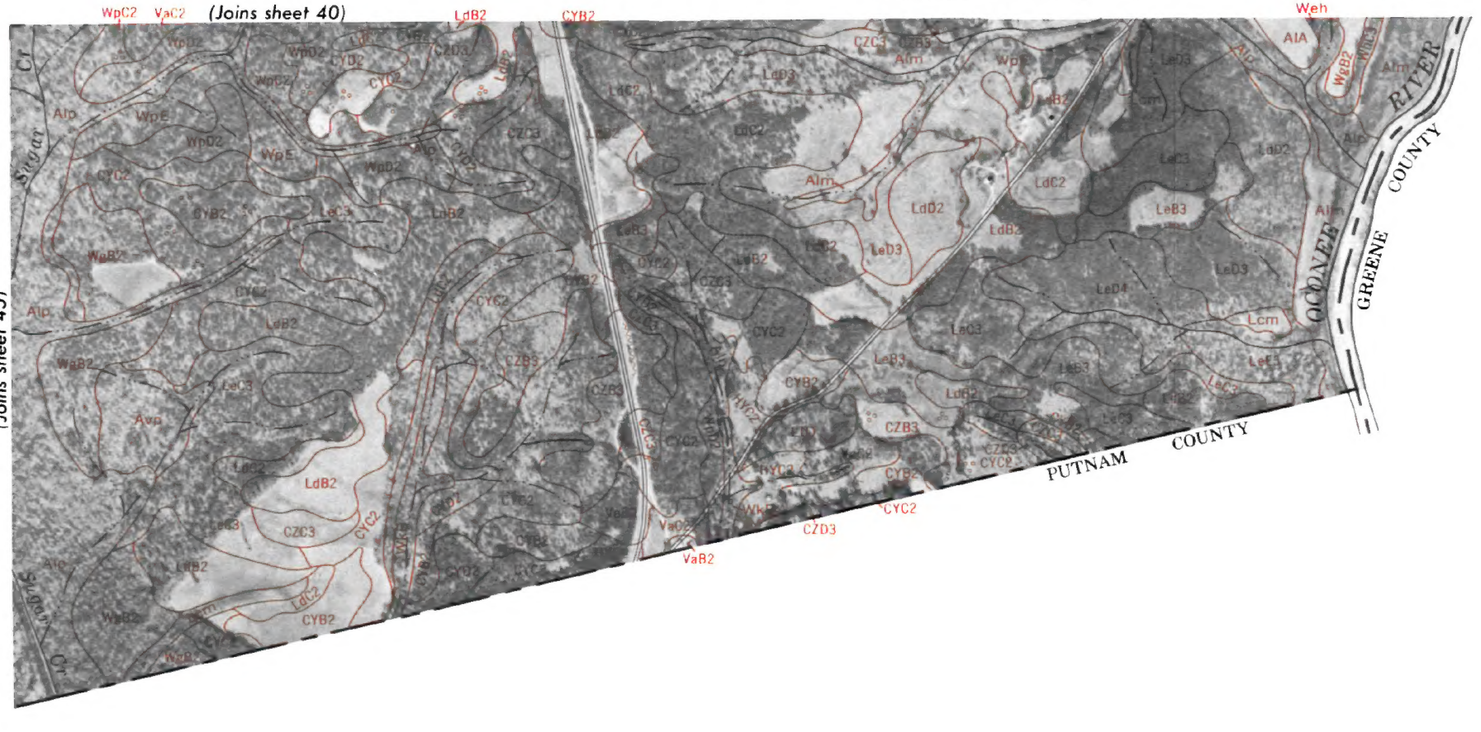
Clarks Fork

Sugar Cr

0 ½ Mile Scale 1:15 840 0 3000 Feet

This map is one of a set compiled in 1964 as part of a soil Survey by the Soil Conservation Service, United States Department of Agriculture, and the University of Georgia College of Agriculture, Agricultural Experiment Stations.

46



0 ½ Mile Scale 1:15 840 0 3000 Feet

(Joins sheet 42)

(Joins sheet 48)

N

Waltons Mill

Little

GEORGIA

JASPER COUNTY

PUTNAM COUNTY

CENTRAL

0 ½ Mile Scale 1:15 840 0 3000 Feet

This map is one of a set compiled in 1964 as part of a soil Survey by the Soil Conservation Service, United States Department of Agriculture, and the University of Georgia College of Agriculture, Agricultural Experiment Stations.

MORGAN COUNTY, GEORGIA — SHEET NUMBER 48

(48)

N

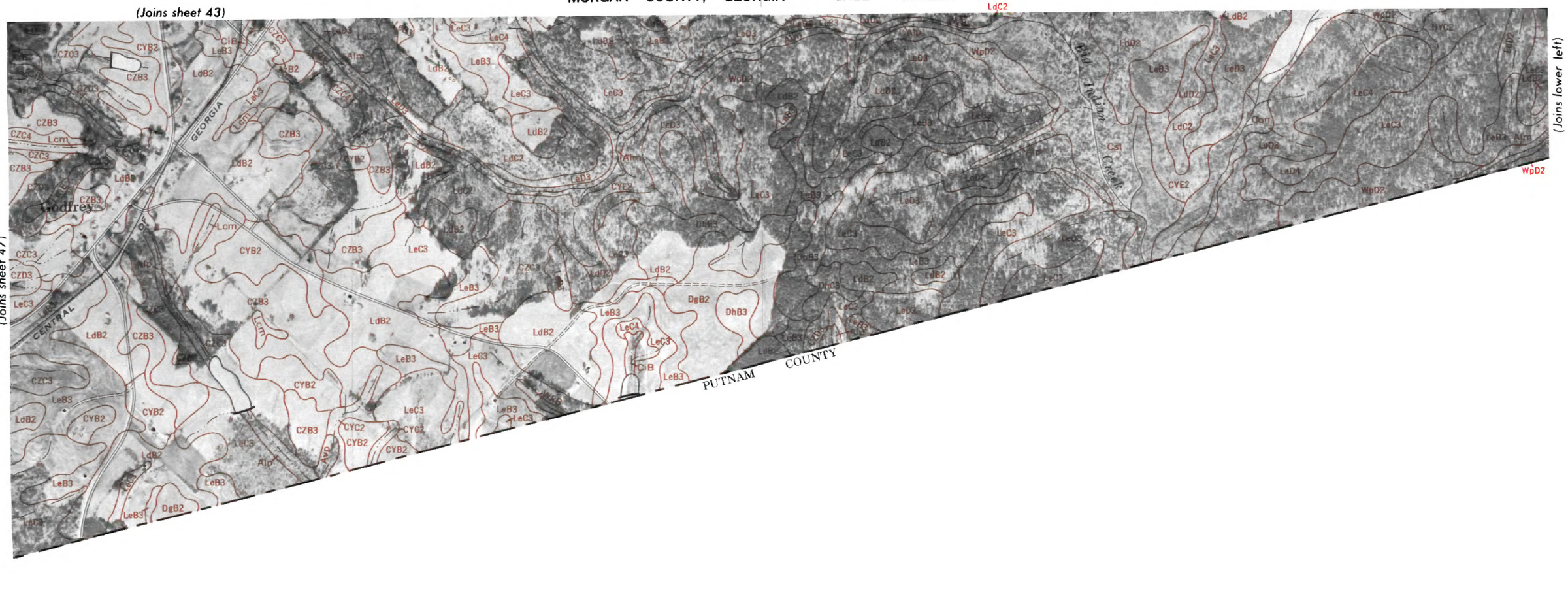
(Joins sheet 43)

(Joins sheet 47)

(Joins lower left)

(Joins upper right)

(Joins sheet 44)



0 ½ Mile

Scale 1:15 840

0 3000 Feet